Murdock Testimony —

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW MEXICO

UNITED STATES OF AMERICA,
Plaintiff,
vs. CR No. 10-2734 JCH
JOHN CHARLES McCLUSKEY,
Defendant.

TRANSCRIPT OF PROCEEDINGS
DAUBERT HEARING
August 21, 2012
BEFORE: HONORABLE JUDGE JUDITH HERRERA
UNITED STATES DISTRICT JUDGE

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THE COURT: Please be seated. Good morning.

MS. MOTT: Good morning.

THE COURT: We're on the record in USA versus McCluskey, CR-10-2734.

May I have appearances, please.

MS. MOTT: Good morning, your Honor.

Linda Mott on behalf of the United States.

Also present today is Mike Warbel, with the capital case unit in Washington, and Special Agent Marc McCaskill with the FBI.

MR. BURT: Good morning, Your Honor. Michael Burt and Teresa Duncan for Mr. McCluskey, who is present.

THE COURT: Good morning to all of you as well.

We're here today to begin our Daubert motions hearing. And we will begin with the firearm issue, which I believe is Document 418.

MS. MOTT: Yes.

THE COURT: Okay. All right.

Are you-all ready to proceed?

MS. MOTT: Yes, Your Honor.

THE COURT: Mr. Burt?

MR. BURT: Your Honor, I have a -- it's my

understanding we have three witnesses for the Court: Mr. Murdock, Ms. Babcock, and then the defense will be calling Ms. Schwartz, who we will probably get to tomorrow.

And I have an initial objection to the testimony of Mr. Murdock. I was informed on July 31 that the government was going to call Mr. Murdock as a witness. On August 7th I was provided with his CV. The CV mentioned that he had a separate list of cases in which he had testified. I requested that list. My request was ignored.

This morning we were handed four volumes of material pertinent to Mr. Murdock's testimony. Those four volumes are sitting over on the table. Included in that four volumes of material is a lengthy PowerPoint which the government proposes to use with this expert.

And our objection to his testimony at this point is based on lack of notice and a Rule 16 violation because, obviously, this PowerPoint was compiled at some point prior to when we walked in here this morning. That should have been provided to us. It was not.

We would ask the Court to exclude his testimony or, in the alternative, take his testimony

on direct and allow us at least some time to review the four volumes of material that we just got that's pertinent to his testimony.

Our expert, who's going to be testifying tomorrow, the government was provided with her CV and a lengthy affidavit outlining the substance of her testimony when our Daubert motion was filed. So I think the government was given adequate notice of the substance of what her testimony was, including a lengthy report.

At this point we have nothing from Mr. Murdock other than, as I say, his CV was given to me on the 31st.

THE COURT: All right.

Ms. Mott, do you have a response?

MS. MOTT: Yes, Your Honor.

Your Honor, the government did come in with a number of exhibits. Not all of them are pertinent to Mr. Murdock. I did provide the Court a list, if I may.

THE COURT: Yes. Thank you.

MS. MOTT: I guess to address first of all, Your Honor, the notice of Mr. Murdock's testimony. That was filed and sent with attachments of the CVs of both Ms. Babcock and Mr. Murdock back at the end

of July.
I did receive a request for the list of cases that Mr. Murdock has been involved in. I received that request on Friday. And I did contact Mr. Murdock immediately for that list. He sent it to me. And I, in turn, e-mailed that on Saturday.
So I am not sure if there's a problem with the e-mail for Mr. Burt or not, but I did provide that to them as soon as it was requested.
The situation here, Your Honor, is that --
THE COURT: Let me ask you this.
How much in those four binders that pertain to Mr. Murdock are things that the defense has not seen before?
MS. MOTT: Your Honor, I can probably tell you that the only thing that is not available and out there is the PowerPoint. And the PowerPoint was -- I was going to address that with the Court before we got started. That was why I talked to Mr. Burt -- is a basic overall, I guess introductory to firearm and toolmark identification. It's not specific to this case. It is regarding the AFTE method of identification. It is regarding different toolmarks and how they are made.
And it is that type of a presentation that

is fairly succinct and would not take that long to go through in terms of what it is. It's not designed in specifics to this case at all, Your Honor. It is for the purpose of Daubert and education and being able to go through that quite quickly.
THE COURT: Let me ask you this.
In terms -- so is Mr. Murdock your first witness?
MS. MOTT: Yes, Your Honor.
THE COURT: And how long do you guess -- I'll use the word "guess" -- his direct would go?
MS. MOTT: All told, probably at least an hour and a half I would say.
I can tell you from the exhibit list, Your Honor, that what we're looking for in terms of his discussion -- and he's certainly not going to go through each of these in depth. It's going to be a summary for the Court if we touch on it.
And the first page is definitely going to be Mr. Murdock, and part of the second page.
And then Ms. Babcock, who's going to be the government's second witness, is going to address another four or five of those exhibits on page 2 and then 3.
And then quite frankly, Your Honor, most of

the rest are all going to be addressed with Ms. Schwartz in quite a lengthy cross-examination that the government has prepared.
And those exhibits are -- have been and are out there for anyone to find, including Ms. Schwartz' testimony and the variety of cases that she has testified in, and hearings, and a variety of cross-examination materials that have been used in other cases where she has testified at hearing.
So those are not unknown in terms of their witness.
THE COURT: Well, here's what I would suggest. I would say that what we should do is begin our -- our testimony. We will -- Mr. Murdock is your first witness, we'll take up his direct testimony, and then we'll see where that leaves us in terms of cross-examination.
So I would suggest that we proceed in that manner.
MS. MOTT: That's fine, Your Honor. Thank you.
THE COURT: Mr. Burt?
MR. BURT: That's fine, Your Honor.
I did not receive the e-mail that Counsel references. And I -- I -- just quickly reviewing

their exhibit list, I do not see that case list in their exhibits. So if she has a copy of that we would request it. I don't know why I didn't get it, but I didn't. So if that's something that can be made available...
THE COURT: Can you make that available?
MS. MOTT: I'll have somebody at the office get it and bring it down.
MR. BURT: Thank you. I appreciate that.
THE COURT: Is there anything else before we begin?
MR. BURT: No, Your Honor.
THE COURT: All right.
Are you ready to proceed?
MS. MOTT: Thank you, Your Honor.
The government would call John Murdock.
MS. MOTT: Just as an aside, Your Honor, I was just informed by Mr. Murdock he actually has a copy with him, so we'll provide that to the defendants.
THE COURT: Okay.
JOHN MURDOCK, GOVERNMENT'S WITNESS, SWORN
DIRECT EXAMINATION
BY MS. MOTT:
Q. Would you state your name, please, and spell

your last name?
A. My name is John Murdock, M-U-R-D-O-C-K.
Q. And, sir, where are you employed?
A. I am currently employed as a contract -- actually, it's a -- the title is criminalist, but I do firearm and toolmark work with the Contra Costa County Sheriff's Office crime laboratory in Martinez, California.
Q. And were you formerly employed at the Contra Costa laboratory as well?
A. I was, for a total of 27 years.
Q. And what were your duties there, sir?
A. I started off in 1966 as a student intern. And I worked in that capacity for one year.

And then for the next 12 years I worked as a criminalist. I did a wide variety of forensic science examinations, processed crime scenes, for example. But the majority of my work was in firearm and toolmark examination, because I liked that the most.

And then for the next five years I was a supervisor of the general criminalistics section. And then following that, for a total of ten years, I was the crime laboratory director.
Q. And where else were you employed after that,

sir?
A. Well, I retired from Contra Costa and went to the Bureau of Alcohol, Tobacco, Firearms, and Explosives crime laboratory in Walnut Creek, California. And I remained there for 15 years, and I worked exclusively as a firearms and toolmark examiner there.
Q. Now in terms of your training for ATF, was that something that was additional to your training that you had already acquired being at Contra Costa?
A. Well, I used the training that I had prior to going to Contra Costa and that I received at Contra Costa as a firearms and toolmark examiner in order to gain employment with the Bureau of ATF.

So although I went to some training classes with ATF, I was already a trained firearm and toolmark examiner when I joined them.
Q. And as part of your continued work with ATF, did you continue to go through training?
A. Yes, I did.
Q. And even now, are you -- do you continue to update yourself on training methods or standards or even literature?
A. Even after 46 years I continue to do that, yes.
Q. Very good.

Sir, how many examinations, firearm and toolmark examinations, would you estimate that you have done during the course of your career?
A. Well, I probably have handled between 2- and 3,000 cases. But any one case can have hundreds and hundreds of examinations. Especially -- we get a lot of gang-associated crime scenes and there can be hundreds of cartridge cases of various calibers that come in from those.
Q. And what about technical review or peer review? Have you done that as well?
A. Yes. In the laboratories that I have worked, both in Contra Costa and ATF, we have a very healthy system of technical peer review. In fact, that is -- having that process is a requirement if you are an accredited laboratory. If you have been accredited by the American Society of Crime Laboratories laboratory accreditation board they do require that kind of technical peer review. So I've done that for a number of years.
Q. Now your curriculum vitae was provided, and it is listed as Exhibit Number 2 for the government. And in that, you list -- part of it is education.
Could you give us a summary of your education and how you became trained and learned, so

to speak?
A. Well, after going to high school in Wheaton, Illinois, I was in the Air Force. And they sent me to California, where I encountered a tuition-free junior college system, much to my surprise. So I took advantage of that.

And after completing junior college, I transferred to the University of California at Berkeley, where I graduated, first, with a bachelor of science degree. And then I was advanced to candidacy for the doctorate degree. And I completed 60 units of graduate work working towards that goal.

And then I started teaching at a junior college and working at Contra Costa, and I found that took up the bulk of my time, so I submitted a master's thesis and was awarded a master's degree from UC Berkeley. That was in 1977.
Q. And during that time, did you have the opportunity to work with some very learned professors?
A. Yes. The main professor that was in charge of the forensic science program at UC Berkeley was Dr. Paul Kirk.
Q. And who is he, sir?
A. He's a very famous biochemist. But he also, in

1953, wrote "Crime Investigation," which is one of the early books of -- excellent book on forensic science. In it, there's chapters on firearms and toolmarks.

Dr. Kirk was also -- he worked on the Manhattan project for the US Government during the -- during the war. He was one of the main people that separated plutonium for the development of the atomic bomb.

Q. Did he teach you about forensic science?

A. He did, indeed.

Q. Now also in your CV, you discuss a number of presentations and teachings or trainings that you have given during the course of your career.

Can you tell us a little bit about the type of trainings that you give?

A. Well, I give various lectures to various groups. As lab director, I gave a lot of lectures to civic groups, just on what the laboratory does, because government has a responsibility to provide information to people that -- whose tax money goes to support our institutions.

I also give -- give lectures at forensic conferences.

And I also have done a lot of teaching. I

taught for 21 years at a local junior college on how to process crime scenes for physical evidence. And I taught them all about how the evidence is used in the laboratory, to kind of motivate them to do a good job collecting it.

Since 1990, I have been associated with the California Criminalistics Institute in Sacramento, and I have specialized in teaching criteria for the identification of toolmarks.

The one-week class is limited to approximately 40 students, because we use microscopes. The students work in teams to compare various toolmarks looking for the best known non-match agreement that they can find.

Since 1990, I have trained probably 250 students in those small -- small-number-of-student classes. So that's over a 20-year period.

I associate with a criminalist by the name of Bruce Moran. He and I give workshops on the same subject, and that's a short version of the one-week class. And these workshops range anywhere from 10 to 20 hours.

And in the last nine to ten years we have trained approximately 300 students in criteria for the identification of toolmarks.

In early October we're scheduled to go to South Africa to train 250 firearms examiners, eight 16-hour workshops in four different cities on the same subject.

Q. Now as part of that training, do you also go over the pertinent or relevant literature on firearms and toolmark identification?

A. Yes. The one-week class has about 12 to 16 hours of discussion from me on the history -- the historical development of criteria for the identification of toolmarks.

The reference articles occupy two four-inch binders, and they're double-sided.

The one week -- or the short workshop has one four-inch binder of double-sided reference articles. And I cover every one of those reference articles, and I discuss the relevant portions with the students.

Q. And is that what we were kind of talking about in terms of you keeping up with the literature?

A. Yes.

Q. And that is directly related to what you train and teach?

A. Yes. I keep up with the literature, though, for another reason. And that is, there are often

technical advances.

There was just -- I'd consider it a hallmark article in the last issue of the AFTE Journal that I received several weeks ago. It's a great article from two firearm and toolmark examiners from Israel on some particular marks that appear on the base of fire cartridge cases, but they're loading marks. And they appear there because, as the cartridge slides against the breech face of the gun, it can be marked by the firing pin opening. And that has not been reported in the literature.

So in addition to keeping up with the literature so I can be conversant with the most up-to-date stuff when I encounter students, it also helps me in my casework, because I am a caseworker. That's what I do with Contra Costa County. They hired me not to teach; they hired me to do work on the bench.

Q. And one more thing about your -- your presentations. I know you present to all kinds of different groups. But did you not just present at the National Institute of Standards and Technology conference?

A. I did.

Q. And that was in July of this year, correct?

A. Yes.
Q. And were you a keynote speaker?
A. I was.
Q. And what did you speak on, sir?
A. I spoke on the historical development of criteria for the identification of toolmarks.

And I also spoke about the absolute need for examiners like myself that work with the optical comparison microscope to work closely with researchers on the development of new technology, most notably the three-dimensional, the 3D analysis of toolmarks, to where you can actually get profiles of the depth of the toolmarks.

And there's been some excellent work that has come out in the last five, six, or seven years on that subject. And that has the potential to push the boundaries of our science even further than it is now.
Q. How so?
A. We cannot give numerical estimates of the strength of association of toolmarks now. It is possible, with 3D analysis of the topography of toolmarks, they can -- they can convert that data into numbers, so they can come up with a mathematical estimate.

And what they're finding is that the data that they get from comparing known matching toolmarks can be separated and is distinct from the data that they get from looking at known non-matching toolmarks.

And what that is doing is, it's showing that they are proving, with these mechanical instruments, what examiners have known for years. We can do that optically, visually, now. And they're actually demonstrating that they can do it with these mechanical -- these mechanical instruments. So that -- that's a real good thing.
Q. Very good.

MR. BURT: Excuse me, Counsel.

Your Honor, our expert, Dr. Schwartz, just walked in. And I did not make a motion to exclude witnesses. I wanted to see if it was okay if she sat in and listened to the testimony.

THE COURT: Is there objection?

MS. MOTT: The government has no objection. In fact, I -- as I turn and look, it appears that Ms. Babcock is also in the courtroom. So that's fine with the government.

THE COURT: All right. That's acceptable.

MR. BURT: Thank you. Pardon the

interruption.
BY MS. MOTT:
Q. Now also on your CV is that you have consulted on numerous times on special projects, and I believe 14, by my count.

And was that also directly related to your experience as a firearm and toolmarks identification expert?
A. Yes.
Q. And can you just give the Court a brief summary of those?
A. Could you tell me what page you're on?
Q. Absolutely.
A. I am on Exhibit 2 in Binder 1.

And may I be allowed to look at my own CV?
Q. That should be fine, yes.

THE COURT: You mean not the exhibit, but the one that you have?

THE WITNESS: The copy I have in front of me.

THE COURT: Sure.

MS. MOTT: He brought one himself.

THE WITNESS: Thank you, Your Honor.
BY MS. MOTT:
Q. On page 21, sir.

MS. MOTT: And I did provide a -- if I may -- a copy of exhibits for the Court.
A. I'm sorry. Is there -- there is a question pending for me, right?
BY MS. MOTT:
Q. Just if you could give the Court a brief summary of how you are called in to consult on some of these cases. It looks like there were not only a couple of high-profile cases, but also administrative inspections, things like that.
A. Well, a number of years ago the California Department of Justice crime lab group wanted to conduct inspections of their own laboratories, and they didn't want to use just members of their own organization. And so they asked me, because I have been associating with their CCI training facility for years. And they asked me if I would be the third person.

So I went and inspected a number of crime laboratories for -- to see whether or not they would meet the ASCLD/LAB accreditation standards. So I did a number of those kinds of studies.

I also was assigned to the District Attorney's office in Contra Costa County, and they wanted me to review the various cases that they got

in order to make the best use of physical evidence.
There was an east area rapist task force in Contra Costa County from '78 to '79, and I reviewed over 40 cases. Those cases are still unsolved, but I reviewed them to try to -- try to get all of the physical evidence out of those cases that I could.
I served as the chairman of the technical board of inquiry in 1979. And this board reviewed the casework performed by the bureau of forensic science criminalists, and they wanted somebody outside of their organization to chair that effort. And I did that and wrote the report.
Q. Now, sir, you've also written quite extensively on the area of firearm and toolmark identification. Isn't that true?
A. Yes.
Q. And I believe pages 10 through part of 15 include a number of those listed. Is that right?
A. Yes. Out of the 26 papers that I have written, about 19 had to do with firearms and toolmark matters. And this is in addition to a thesis for a master's degree at UC Berkeley. And there were two graduate papers that I wrote at UC Berkeley, also, on the same subject.
Q. Now did you also, I believe, coauthor a

chapter --
A. Yes.
Q. -- in a book?
A. Yes.
Q. Can you tell us what that was about?
A. Well, it started out in 1997 as a two-volume set, and it is called "Modern Scientific Evidence, the Law and Science of Expert Testimony."
And my understanding is that that set was written in light of Daubert, to provide -- to provide the judiciary with information about the various forensic specialties, to help make rulings in -- in hearings like this, Daubert hearings, and/or Frye hearings, depending on the state you are in.
One of the chapters is on firearms identification. And I coauthored that in 1997 with Al Biassoti.
Q. And just for the record, we are referring to Exhibits 16 and 17 on "Modern Scientific Evidence, the Law and Science of Expert Testimony." And that is in Binder 2.
A. Although it started out life as a two-volume set, it is now a five-volume set. And the edition is 2009/2010.
Q. Now, you've provided that chapter and then,

obviously, quite a long footnote as well.
Was there a reason that you provided the footnote as well?
A. The footnote, although by legal standards is probably a short footnote, but by our standards it's a long footnote. It's about a four-page footnote, and it is on the subject of subclass characteristics. And so that essentially amounts to almost a standalone article on the subject of subclass characteristics, and I'm certain that we'll be discussing subclass more.
Q. Now, you also belong to several professional associations. And if you would, just give the Court a brief summary of the associations and any offices that you hold.
A. I belong to the Association of Firearm and Toolmark Examiners. I've been a member of that group since it started, actually. I've held several positions in that group, and I was the -- I was the co-chair of their certification committee for two years. And then for the next two to three years I was the chairman of that committee.
And the end result of that was that AFTE, which is the acronym -- that's A-F-T-E, the initials of the Association of Firearm and Toolmark

Examiners -- developed a certification program for members. They certify in firearms, examination of toolmarks, and gunshot residue examination and identification.
And the good news is that we developed what I think is a quality certification program, in large measure because of an NIJ grant.
The bad news is that I can't be certified by that organization because I helped develop the program.
Q. Now, does AFTE also have an ethics board?
A. They do.
Q. What about the advancement of science committee?
A. I'm the current chairman of the AFTE advancement of the science of firearm and toolmark committee. I have been in that capacity now for about -- probably four years.
Q. And you've mentioned that AFTE certifies its members in various areas.
A. Yes.
Q. As the person who chaired that and set that up, how do you certify someone?
A. Well, you have to have a certain requisite number of years of experience doing the work. And

then you apply for certification and take a written test in any one of those three areas.

You have to successfully pass the written test before you can move on to take the practical examinations. And those examinations are usually two-part. They are proctored by somebody that is already certified.

And the results are sent in and evaluated. And if you have successfully completed those, you are awarded certification and you get a certificate which is good for a certain number of years.

They have a program of recertification points, activities -- professional activities that you can engage in in order to maintain your certification.

Q. And I also asked you briefly about an ethics standard and committee.

Is there an ethics committee and a -- that promulgated the standards?

A. Yes. AFTE has had an ethics code since about 1980. They actually -- they actually adopted the one that was written many years before by the California Association of Criminalists.

And then in 1979 the California Association of Criminalists, to which I also belong, I co-chaired

the effort to write a rather extensive enforcement procedure for the ethics code.

And I'm happy to report that AFTE saw fit to adopt that enforcement procedure.

And it was designed to afford those accused due process of law, and it's worked fine over the years.

AFTE takes ethics enforcement seriously, and we are on record, actually, as enforcing it. And we have had rather spirited hearings at our meetings sometimes because of that.

Q. Now, I believe I mentioned standards, but not in the context of AFTE.

In general, does AFTE also have complete standards?

A. They have documentation standards. They have a glossary. They have -- they also have a training program. So --

Q. And they -- I'm sorry, go ahead.

A. So they -- they have developed a number of those professional materials over the years.

And of course there's a closely related group which is the scientific working group for firearms. And that's abbreviated SWGGUN, S-W-G-G-U-N.

SWGGUN also adopted documentation standards and a wide range of other standard materials.

Q. And, sir, how many times would you say you have testified as an expert in court on firearms and toolmark identification?

A. Well, I've testified in total close to 200 times, and probably only a fourth of those has dealt with firearms and toolmarks.

Since I started work for ATF in '93, I have testified approximately 40 times in firearms and toolmarks.

Q. And has that been in State and Federal Court?

A. Yes.

Q. And have you ever been excluded from testifying on that subject matter?

A. No.

MS. MOTT: Your Honor, at this time I would move to recognize Mr. Murdock as an expert in firearm and toolmark identification, as well as the literature surrounding that field.

MR. BURT: No objection.

THE COURT: The witness will be recognized as an expert in both firearm toolmarks as well as the literature.

MS. MOTT: Thank you, Your Honor.

It's at this time I would like to go ahead and present to the Court the PowerPoint presentation which is going to cover a number of the terminology that we just discussed, and probably -- hopefully, put it into a better context, in terms of what we will then discuss afterward and any follow-up questions from the government that are -- go more in-depth.

And, Your Honor, we propose that Mr. Murdock just kind of run through it. For me to interrupt and ask questions in between, it's going to hinder the time frame, so to speak. I think it will be much more succinct and expedient if I just allow him to run through that little presentation, and then I will follow up with questions.

THE COURT: Do you have any comment on that?

MR. BURT: Your Honor, as long as it's not into some long narrative that has nothing to do with issues before the Court. And if that's what it evolves into, I will object.

THE COURT: You'll bring it to our attention, I'm sure.

MR. BURT: Yes.

THE COURT: All right. That's fine. We

can proceed in that manner. If it turns out to be something that's maybe not workable we might have to readjust. But I will -- we'll proceed in that manner.

MS. MOTT: Okay. Thank you, Your Honor.

THE WITNESS: So I assume, since a copy of this in some form will be an exhibit, that it -- would it be all right if, on some of these slides, I simply summarize what's on there?

BY MS. MOTT:

Q. Yes. I think that would be more expedient.

A. Good.

Q. Absolutely. And it is Exhibit 48, and that is in Binder Number 4.

A. All right. This is Slide Number 2. And as it says, some of the material in this program was provided by the Scientific Working Group for Firearms and Toolmarks, and that's SWGGUN. And that's to assist examiners in describing the basis of what we do.

I modified the presentation, however. I have added some specific things to make it clearer, in my opinion. And I did that on August 17th of this year.

Next.

So the basic outline of things that I'm going to cover debates a simple overview of science and forensic science, some of the fundamentals of firearm and toolmark ID.

I will discuss how we, in our opinion, meet the Daubert criteria, and then I'll summarize.

I'll talk about what science is. It's the scientific method, and what is forensic science.

In my opinion, science is simply a systematic way to gather knowledge. It's -- you observe, you identify, and describe things. It's an experimental investigation, and then you develop theories.

The scientific method is a process, so that when you're investigating a problem you know where you are, where you've been, where you're going. And when you get near the end you should know that you are near the end.

So basically, the method is as listed here. You are -- you start out by investigating a problem. And the problem could be anything. For example, was the cartridge case fired in this particular firearm that was submitted?

And you develop a hypothesis. All a hypothesis is is a-tentative explanation for

something. It can be proven right or proven wrong.

And then proceed to test that hypothesis. If, by testing, you've proved it wrong, you go back and you reformulate another tentative explanation and you begin the -- you -- you begin the testing process again.

If, at the end of your testing, you have proved your hypothesis, and if the hypothesis can be proved by other researchers duplicating what you have done, in the end you can formulate a theory.

And theories are used to predict events of a similar nature.

Next.

The theory must be testable and it has to be validated through the testing of the propositions upon which our science is based.

Forensic science is just the application of science to law.

Fundamentals of firearm and toolmark, I'm going to go over these. I'm going to define some things, talk about fundamental propositions one and two.

I'm going to talk about how we do our work and what our range of conclusions can be.

The subject of firearm and toolmark

identification is simply an empirical -- which means it's done by experimental comparison -- comparative analysis that can determine if a striated scratch mark or an impressed mark was produced by a particular tool to the practical, but not the absolute, exclusion of other tools.

The tool. Basically, a tool is the harder of two objects that come into forceful contact with one another, and it results in the softer one being marked. To us, the firearm is just a collection of tools, and I will show some of those tools in a moment.

This is a schematic which shows just a broken-away view of a semiautomatic pistol. The hammer is back in the cocked position.

Next.

Now you see some views have been made so that you can see them right in the center -- and I inadvertently obliterated what I wanted to point to, but it was the ejector. The ejector was in the middle of that kind of messy-looking circle that I just drew.

Next slide.

This is the cutaway view of the inside of the barrel on the right-hand side. The firing pin

would be located back in this position (indicating).
Next view.
These are tools that are made inside the gun. You have the -- you have the gun barrel, you have the breech face, firing pin, the ejector, and the extractor.
Next.
Now, those tools are labeled. Those are individual tools, and firearms examiners have to be concerned with the working surface of each of those individual tools, because any one of those tools can be used to make marks on the fired cartridge cases or in the case of the gun barrel on fired bullets.
Next slide.
The toolmarks are simply features that are imparted on an object that's marked by contact and force from a tool. And there are two main types that we work with: Impressed marks, where it's more of a stamping operation, and striated marks, which are more of a sliding operation.
Next.
Here's an example of impressed toolmarks: Marks produced when a tool contacts an object with compressive force so it leaves an impression.
On the right side of the screen you see

a -- you see the primer on a fired cartridge case. The firing pin impression is in the center and the marks from the breech face surround it.
On the left side you see the edge of a hammer impression.
Next.
These are striated toolmarks. The lower right-hand corner shows a fired bullet. That's a land impression in the center, and groove impressions are adjacent.
On the left side of the screen you see a non-firearm type of toolmark. That can be produced by a screwdriver, for example.
Next.
Here's another -- this is an overview of a gun. You can see the extractor, the breech face, and the chamber.
Now, we're going to focus our attention on the breech face itself. We're going to look straight at it.
The next slide.
Next slide, Linda.
Thank you.
This is a breech face. We're looking straight at the breech. The breech face is the

surface against which a cartilage rests when it's in the gun. When it's fired, it comes back with a lot of force and slams into that surface.
The firing pin, which is not visible, comes out of the center towards us and strikes the -- strikes the primer.
The firing pin aperture is the -- the ring of the opening of the firing pin hole. "Aperture" simply means "opening." And that ring can cause various kinds of marks on the primer.
The ejector, in the lower right, that is a stationary piece of metal that strikes the cartridge case and throws it out of a firearm.
The extractor -- the extractor is in the lower left, and that grabs ahold -- it's simply a hook that grabs ahold of the rim and helps to remove it. It has its greatest use when you're removing unfired cartridges from the chamber. In firing, actually -- the force of the firing is enough to cause removal in most cases.
And the breech face itself is that surrounding metal.
Next.
This is a diagram that was actually produced by Lucien Haag years ago. And it shows the

various toolmarks that can appear on a fired cartridge case: Magazine marks in the upper right are caused by the magazine lips that hold cartridges in; ejection port marks; the chamber marks. Starting at the lower left, ejector marks from the ejector that you've already seen; firing pin aperture marks; firing pin impression in the center. The firing pin drag mark will show up at 12:00, and then the breech face marks.
We look for all of these marks when we evaluate cartridge cases under the microscopes in the laboratory. There may be some of use, there may be most of them of no use for comparison and ID purposes.
Next.
These are the helical grooves, or the rifling inside of the gun barrel. And the long view at the top shows a cutaway of the rifling.
Next.
Marks left on fired bullets. The common calibers are shown there in circles all the way from .22-caliber up to -- up to .45-caliber.
The common rifling you can see inside of the gun barrel. You're looking, actually, from either end.

The bullet, in profile, a cross-section looks like that.

The side view of the bullets are in the lower left.

And this diagram is made up by Al Biassoti, actually, in 1955.

Next.

The science of firearm and toolmark ID is based on two fundamental propositions: One, individual toolmarks imparted to objects by different tools, firearms or non-firearm tools, will but rarely, if ever, display agreement sufficient to lead a qualified examiner to conclude the objects were marked by the same tool.

Next.

Most manufacturing processes involve the transfer of rapidly changing marks onto pieces that are made, such as barrel bores, breech faces, firing pins, screwdriver blades, and the working surface of other common tools.

This is caused most of the time by wearing of tools and the formation of chips. Try as they will in factories -- they try all sorts of lubrication -- there still occurs the wearing and the chip formation on surfaces that are produced.

Microscopic marks on tool working surfaces may then continue to change from wear, corrosion, or abuse.

Next.

There are three kinds of characteristics that we work with. The first is class characteristics. Those are defined as measurable features of a specimen, and they indicate a restricted group source. They're designed by the factory. They are determined prior to manufacture.

For example, here is an example of class characteristics.

Manufacturers design their rifling in different ways. They can have different widths, different angles of twist.

On the right-hand side is a fired bullet. You see groove impressions marked there and land impressions. That's a class characteristic.

Next.

Here's a class characteristic of a screwdriver tip. And that would be the width of that screwdriver tip.

The subclass characteristics are features that may be produced during manufacture that are consistent among some items made by the same tools in

the factory. These are not determined prior to manufacture, and they -- they result in a more restrictive class than the class characteristics.

In our field we have numerous references. I think there is an exhibit that will be provided that lists over 90 of those references that provide guidance to people like me for the evaluation of subclass influence.

Next.

Here's an example of subclass characteristics on the -- one side of the jaw of a pair of bolt cutters.

One of the hallmarks of subclass characteristics are the continuous evenly spaced marks, as you see in the exploded view on the right-hand side of the screen.

Next.

Not every machining process in the factory produces subclass characteristics. Those that do, do not always transfer them onto the work pieces that they fabricate.

When subclass markings are produced on work pieces, identification by toolmarks may still be possible right within the subclass features or right adjacent to them.

Next.

Subclass characteristics may be present near the working edge of tools and yet have no influence on the production of individual toolmarks.

And they may also be present on the working edge of a tool, but due to the angle of application of that tool pitch onto an object marked, no subclass influenced toolmarks are produced.

Here's some examples.

This is a firing pin.

Next.

A little closer view, and we are going to look real close at the tip, which is on the right-hand side.

Next.

Assume that the firing pin, during manufacture, is rotated in the direction of the arrow.

Next.

Here is a tool that will create some circumferential toolmarks on the tip by a lathing operation.

The next slide should show that moved in, right like that. So the tool moves in and it cuts these grooves in the tip of the firing pin, which you

can see in the next slide.
The slide after this.
This is the view of the end, the direct end of that firing pin. And you can see those circular marks. Those are potential subclass features, so you can find other firing pins lathed in the same way that will have similar markings.
So if an examiner sees a fired cartridge case with these circular marks on the bottom of the firing pin impression, that's a danger sign. Those could be found on another tip of a firing pin.
So we would not use those coarse circumferential marks, those circles, for identification purposes.
But within those -- I'm sorry, next slide.
Here's the circular marks that we would not use for identification purposes.
And the next slide.
And the next slide.
This slide shows red outlined areas of damage. This damage is caused during manufacture due to the chattering, due to the tearing that I mentioned earlier, that can be used for identification purposes.
So here's a perfect example of some

irregularity, some damage that we can use for positive identification of toolmarks, and they coexist peacefully among the subclass characteristics.
Next.
The next slide.
Individual characteristics, the third kind of characteristic we use, are marks or features produced by the random imperfections or irregularities of tool surfaces.
You just saw an example of those on the tip of that firing pin. These can be used to individually associate a tool to a toolmark.
Next.
How are they produced? They're produced by manufacture in the way that I've described.
They're produced from wear, from use, from abuse, and from damage and corrosion.
Next.
Here is an example of individual characteristics from manufacture. The edge of this knife blade, the working edge that you see enlarged on the bottom, has been ground. Grinding usually results in individual toolmarks being produced.
Next.

Here's examples of individual characteristics from wear. Here is a hammer face on the left, and here is abuse.
Somebody has used this pair of bolt cutters -- I shouldn't say in a way that was inappropriate, because I have used bolt cutters that I thought were strong, tried to cut a bolt that I should have been able to cut, and in turn all I did was damage the bolt cutter. They were made in an inferior way. They weren't strong enough to do the job.
So this kind of abuse can cause individuality to a tool working surface.
Next.
Here's a hammer face.
Next.
We're going to be looking in detail at the area of the face itself.
Here's the face of that hammer. You can see all the irregularities: The chipping along the edge and all the irregularities on the flat surface. Those weren't manufactured in there. This hammer face was smooth when it was made.
Next.
On the left we have an impressed mark in

sheet lead. We use lead a lot for test marking in the laboratory. It was made by that hammer.
Now we're going to see the comparison of defects on the hammer face with corresponding defects. It will be a mirror image on the left.
Next.
Here's one example.
Next.
Here's another.
Next.
And next.
Here's a fourth example of imperfections -- individual detail that have been transferred over onto an object marked. That can be used for positive identification.
An example of class characteristics for -- for elimination but not individualization, is shown here.
The bullet on the left is -- was fired through a gun barrel with right-hand twist.
The one on the left -- the one on the right-hand side was with left-hand twist.
They're also different diameters. Those bullets could not have been fired in the same gun barrel because the class characteristics are

different.

We use comparison microscopy to evaluate whether or not there's sufficient agreement to make an identification after we rule out subclass influence, because subclass influence must be eliminated in order to make a positive identification of toolmarks.

We see, through the comparison microscope, the kind of view that you see on the lower right side of the screen. And we use the kind of comparison microscope you see on left side.

That microscope is made by Leica. It's a -- it's a very high-quality instrument. It runs 50- to $60,000, and the optics are unparalleled.

Next.

We have a range of conclusions when we make our comparisons, and they run from identification, at the top, to unsuitable for examination at the bottom.

The second category are inconclusive, and there are three subcategories.

And the third category is elimination.

The only reason that this says "inconclusive" is because they are conclusions that are less conclusive than an identification.

Could you go back to the previous slide?

I was chair of the committee that fashioned these range of conclusions. And in retrospect, the use of the word "inconclusive" was a poor choice of words because some reports are issued these days, and the examiner just says, "I compared A with B and I found the results to be inconclusive."

That's not really what they found. They found something and they should report what they found and not just report inconclusive, because inconclusive demands an explanation. So why not eliminate the word "inconclusive" and just put the explanation in there, which you'll see some examples of in a moment.

Next.

Identification, at the top of the range hierarchy, is agreement of a combination of individual -- and there's a reason why that's bolded. You can't identify on the basis of subclass features. They have to be unique -- characteristics and all discernible class characteristics, when the extent of agreement is greater or exceeds that which can occur in the comparison of toolmarks made by different tools and is consistent with agreement demonstrated by toolmarks known to have been produced by the same tool.

Stay on this slide just for a moment.

The part where it says "the extent of agreement exceeds that which can occur in the comparison of toolmarks made by different tools" is critical.

Because whenever you compare two toolmarks made by different tools, there is a chance that you will always find some agreement. The examiner has to know how much agreement is the best agreement that you can find in toolmarks made by different tools. Because only when you exceed that agreement can you make a positive identification.

Next slide.

Here's some examples of an identification where the extent of agreement greatly exceeds that -- the best agreement in known non-matching toolmarks.

Next.

There's also sufficient agreement shown here. These are firing pin aperture shear marks, and there are two different ones shown. So you can see the pattern of scratch marks appears different between the left photograph and the right.

These photographs were taken on a comparison microscope like the one that you saw.

Next.

These are the inconclusive ranges:

A, where you have some agreement of individual characteristics. All the class characteristics agree, of course, but the agreement of individual features is just not enough for an identification.

B, all class characteristics agree, again, but you don't have very much agreement or disagreement of individual features for whatever reason.

And C, all the class characteristics agree. You have some disagreement of individual features, but not enough to say that they were fired in different guns or made by different tools.

Next.

Here you have -- in these marks you have some agreement, but there's just not quite enough -- you see much more detail on the left side than you do on the right side. If they were made by the same tool it could be -- the difference could be due to variation of pressure.

But that's an example of -- that this is not an ID, but there is considerable agreement between those two, and they could certainly have been made by the same tool or working edge.

Next.
An inconclusive B. And even though the class characteristics agree -- this is the length of a land impression -- but you certainly don't have any agreement or disagreement of individual features because there are not many there.
Next.
Elimination, where you have significantly -- you have different class characteristics or individual characteristics.
And I showed you an example earlier of a bullet that had left twists and one that had right twists, so you eliminate that.
Next.
Here's an elimination. These are both fired cartridge cases, and you can see how different they look. The firing pin aperture that the cartridge case on the right was fired in is rectangular, very typical of Glock pistols.
The one on the left, the aperture was round. They were fired in different guns.
Next.
This is a class characteristic elimination. Here you have the end of a pry bar, and you can see it doesn't bear any resemblance to the width of the

mark. That's a total elimination.
Next.
Unsuitable. The item is either too damaged or it's too small. There's simply no usable toolmarks there.
Next.
The basis for firearm and toolmark ID. We're going to talk about standards of ID, subjective evaluations, what makes an ID possible, and then the significance of conclusions.
Next.
The theory of ID, as it pertains to the comparison of toolmarks, enables opinions of common origin to be made when unique surface contours of two toolmarks are in sufficient agreement.
Next.
It's significant when it exceeds the best agreement demonstrated between toolmarks known to have been produced by different tools and is consistent with the agreement shown by tools producing the same -- or marks known to be produced by the same tool.
And I've discussed that in detail earlier.
In the application of the AFTE theory of ID, which by the way was adopted in 1992, a

subjective determination of whether sufficient agreement is present for identification must be made by a qualified examiner.
Next.
Conclusions in toolmark ID are based on a subjective evaluation of the agreement observed between two toolmarks. This does not mean, however, that this kind of evaluation is unreliable or unscientific. There is subjectivity in every science and every test.
For example, there's subjectivity when a doctor diagnoses you or a histologist examines slides for cancer cells.
Next.
What makes an ID possible? First of all, a sound examination method by employing the precepts of empirical research or study in the comparison of two toolmarks.
Specialized training to develop cognitive skills. Examiners undergo standardized technical training that develops these skills and allows them to recognize, differentiate, and understand the patterns of marks and their uniqueness or not.
Based on propositions one and two, individual associations or identification conclusions

are possible. These are made to a practical certainty. As it says in the validated AFTE theory of ID, they are not made to an absolute certainty.
We don't make an identification to the total exclusion of other guns in the world or of other tools in the world. To do that we'd have to look at all of them, which is clearly impossible.
Next.
The five prongs of Daubert are as listed:
Is what you're going to testify about, is it testable?
Is it generally accepted?
Has it been subject to peer review and publication?
Is there a known or potential error rate?
And do you maintain standards of control?
Next.
The testability aspect requires a critical evaluation process that supports or refutes a hypothesis.
Next.
What evidence exists to support our science? There are numerous empirical and validation studies of consecutively made tools that have been published over the past 90-plus years.

There is a good example from 1907 on the Affray at Brownsville incident. This was reported in the AFTE Journal. It was a verbatim report. They had approximately -- I think there were close to 30 fired rifle cartridge cases at the scene. And they examined many, many rifles and were able to group them and tell which rifle made those -- or, rather, they were able to determine which rifle fired which cartridge cases.

Next.

Here's some examples of consecutive manufacture studies. These are on gun barrels that were rifled with cut rifling. This is where tools are drawn through the gun barrels and actually, the rifling is cut rather than being formed. And the author is listed on the left side, and the years of their study are listed in parentheses following.

Next.

These are some studies -- mine is in here also. I did it in 1981.

These are on forged rifling. The rifling wasn't cut, it was formed either by being hammered against a mandrel or having a hard carbide button drawn or pushed through so the rifling is formed. It's a different manufacturing process, so we wanted

to test empirically whether or not that would result in individual bullets.

And electrochemical rifling. DeFrance did that in 2003.

Next.

Consecutive manufacture studies of other firearms components. The reason we focus on consecutive manufactured studies is because it is the worst-case scenario.

You go to the factory and you obtain consecutive series of various tools or -- or guns, and you study the effect that those consecutive items have.

Once again, the author is listed on the right. The subject is listed, whether it's breech faces, bolt faces, extractors, and the years are listed after that.

Next.

These are other tools. These are non-firearms tools now. Authors on the left, the subject matter. It runs from chisels to screwdrivers to bolt cutters, drill bits, knives, pliers, and more knives. And the years are listed on the right.

Next.

Steel stamps, more chisels, screwdrivers,

more knives. They focus a lot -- the guys like knives, so I think that's why they study knives a lot.

Could you go back to the -- I'm sorry.

Next slide.

So the summary of empirical research. These studies have been found to support Proposition 2, that I already described. But briefly, it is most manufacturing processes involve the transfer of rapidly changing or random marks on the pieces that they fabricate: Barrel bores, breech faces, screwdriver blades, et cetera.

Next.

And it is -- let's go back to the previous slide, please.

And it is all of those studies and more that form the backdrop for the AFTE theory of identification that was put together in 19- -- adopted by AFTE in 1992.

So we looked at all of those studies which have been summarized by Ron Nichols in two papers. His number one paper is the one that we used, and those will be introduced as exhibits.

All of those studies either were done in part or wholly according to the scientific method.

And it was those studies that formed the backdrop for the AFTE theory of identification.

Next.

General acceptance. The approval by a particular authoritative body of a technique or methodology, in addition to the forensic science community. Because in my opinion, AFTE is the relevant -- is the relevant authoritative body in this field.

There have been numerous colleges and universities that have courses in firearm and toolmark ID.

Funding of scientific research in our area has been granted to researchers outside of our community.

It's been accepted in court for over 100 years.

And the American Council on Education awarded college credit to students of the US Army crime laboratory for their firearm and toolmark curriculum.

Next.

Some academic programs. There are close to 45 programs listed here. This is a list that was developed by people that were actually familiar with

these institutions and their programs. A lot of it came from the SWGGUN group, whose members were very familiar with these. And there are a number of members in AFTE that actually teach at some of these institutions as well.

Next.

Grant programs. The NIJ. I mentioned earlier that NIJ funded the AFTE certification program, development program.

There is a -- there's a funding group that is similar to NIJ in Belgium.

And there's a Canadian police research center in Ottawa that also funds research in our areas.

Next.

Grant or accepted government teaching programs for firearms ID.

The NIJ, in association with the National Forensic Science Technology Center, funded a distance learning program for our field.

The FBI, since '86 -- I was actually in that 1986 course. It was a pilot, and they wanted us to evaluate it. We gave it high marks, and maybe that is one reason why it's continued ever since, specialized techniques in firearms identification.

The Bureau of ATF, since '99, has offered a one-year course titled the NFEA, National Firearm Examiner Academy. It's a one-year-long program. At the end of that program, however, the person is not ready to begin working in a comparison capacity in a laboratory, but they have had a heck of a good head start. I helped develop that curriculum and taught there for the first five years.

California Criminalistics Institute, at the California Department of Justice. I mentioned that I had been with them since 1990, and they offer a variety of courses in firearm and toolmark examination.

Next.

The Daubert element of peer review and publication. Peer review is simply an evaluation of a colleague's research.

Can peer review offer an absolute way to ensure the integrity of scientific research? No, it cannot.

Fraudulent articles still slip through the best type of peer review programs. But it's all that -- all that technical publications have. And in my experience with AFTE, they're serious about their peer review process.

One of my colleagues, Eric Collins, is a peer reviewer. I help Eric and he puts those -- he puts authors through a great deal of stress and makes sure they get their articles correct.

AFTE has had a journal since 1969. It started out early as a newsletter, and then it morphed, appropriately, into a journal.

American Academy of Forensic Sciences, since 1942.

And the International Association -- the International Association of Identification Journal of Forensic Identification.

Firearm and toolmark articles are published in all of these journals.

Next.

Error rate is the frequency of which one deviates from a correct standard.

Errors can occur from a number of sources, and may result in the worst error, which is a false positive error.

The ID of a toolmark to a tool when the questioned mark was not produced by that tool.

A false negative, elimination of a toolmark as having been produced by a tool when the toolmark was produced by it.

Next.

The collaborative testing service, CTS, is the main producer of proficiency tests in the United States, and they have been around for a number of years.

Here is a summary that Doug Murphy, of the FBI, did from 1992 until the year 2000, and then 2003. It's 1.9 percent firearms false positive, and the toolmark false positive was 2 percent.

Stay on this slide just for a moment.

CTS has been sending samples out ever since 1979. They started out with firearms samples. So from 1979 until 2002, the false positive error rate for firearms was 1 percent.

They started three years later, in 1981, sending non-firearm toolmarks. And the non -- the rate for -- false positive error rate for non-firearm toolmarks from 1981 through 2002 was 1.4 percent.

Next slide.

Some validity study error rates. Validity studies are studies where the author prepares samples of various sorts and seeks the services of experienced firearm and toolmark examiners to evaluate those samples, make comparisons.

Most of those samples are declared. That

is, the people that take the test know that they are being tested.

Various degrees of blindness can be inserted into those tests. A true double blind test of any sort, whether it's used by the drug industry or others, is where no one knows that they are being tested and the people that give them the samples don't even know that they are test samples.

Those are extremely difficult to administer in working crime laboratories, because working crime labs depend on various kinds of background information to decide what cases they should look at, which samples they should look at first, and so on.

So these are declared tests, but they have some blind elements. The people taking the test don't know -- don't know the answers. And they can be further blinded by the fact that the people administering the test don't know the answers either.

And furthermore, the test samples can all be different. So no amount of communication between test takers will do them any good at all. So if you let them know that up front, that's one other aspect of blindness.

Another aspect is those people that give the -- that hand in the results can never be

identified with the particular result that they hand in. So there is nothing to be gained by couching your examination results in vague terms or saying inconclusive because you don't want to run the risk of making an error.

So even though these validity studies are most of the time declared, various degrees of blindness can be instituted in the process.

The error rates are listed on the right, and they range from zero percent for most, to .78 percent for a Thompson & Wyant study in 2003.

Next.

The maintenance of standards and controls, which is the last Daubert factor. It provides guidelines and protocols for conducting analytical testing, monitoring quality assurance and controls, and representative documents that are used.

Every agency that is accredited by ASCLD/LAB, like I've already -- like I have already described -- has protocols that are usually very detailed.

SWGGUN has guidelines.

AFTE has produced a technical procedures manual and they have, like I have already mentioned, a theory of ID glossary training manual.

Next.

Firearm and toolmark identification, in our opinion, meets the reliability standard put forth by the Daubert decision in 1993.

It's testable, generally accepted, it's peer reviewed. We have an error rate that is -- it's not the best error rate because there are limitations to CTS proficiency testing, but it's the best that we have.

And we do maintain standards and controls. We have protocols that guide the examination process.

Next.

And last.

THE COURT: At this time we'll take our morning recess. It's about 26 minutes after, according to the clock on the wall.

We'll be in recess for 15 minutes.

(A recess was taken from 10:24 a.m. to 10:44 a.m.)

THE COURT: Please be seated.

We're back on the record.

You may proceed.

MS. MOTT: Thank you, Your Honor.

BY MS. MOTT:

Q. Mr. Murdock, I have a few followup questions

for you from the presentation that you made. And some of them will be basically to expand a little bit more on some of the things that you touched on in that PowerPoint.

THE COURT: I can't tell if your microphone is working. You might pull it closer to you.

MS. MOTT: The light is on.

THE COURT: Okay.

MS. MOTT: Is that better?

THE COURT: Marginally, not really.

If you can try to speak into the microphone. Thank you.

MS. MOTT: I will do that. Thank you.

BY MS. MOTT:

Q. At one point you said that examinations must be made by a qualified examiner.

Can you explain exactly what you're talking about by a qualified examiner? Is that one that has been trained in the AFTE theory of identification and/or certified by AFTE?

A. Well, you don't have to be certified by AFTE to be a qualified examiner. There are a number of very skillful qualified firearm and toolmark examiners that have not chosen to go forward with the certification.

It means that a person has gone through the program of study and training and has successfully completed a series of proficiency tests that allows them to be -- to be offered up, or allows them to be certified to do casework.

Q. You also mentioned learning about how tools are manufactured. Is that something that is important for a firearms examiner, to actually go to a manufacturing plant, see how things are manufactured, and possibly talk to those who manufacture?

A. You can certainly do that. But there is a lot of very good -- very good illustrative material that's been printed and written on manufacturing processes. So you don't really have to go to a factory to learn those things.

You could -- but you should study about the types of machining operations that are used to finish the working surface of tools. That's the important part.

Q. Very good.

Now, one thing that you discussed -- you discussed before, and then discussed in the PowerPoint, was literature and the publication and peer review of literature.

A. Yes.

Q. You also discussed the AFTE Journal --

A. Yes.

Q. -- and mentioned several other journals that deal specifically with this field.

And those are all peer-reviewed publications. Is that right?

A. Yes.

Q. And is that a formal process, in terms of the peer review of publications?

A. Well, when -- when peer review is associated with publications, with the journal, it certainly is a formal process. And the process can vary extensively, depending upon -- upon the process.

I know AFTE's peer review process has gone through an evolution.

And at one point, I think it was -- his name is Dominic Denio, D-E-N-I-O. He published, in the AFTE Journal, a chronology of the peer review process.

And so it's gone from very informal -- when AFTE started out, there were some folks in the industry that thought, well, this journal is not going to last. I mean, how much do these guys have to write? They're going to write a few articles and nobody is going to be submitting anything.

And so at first, they had -- they had a bring-us-your-huddled-masses kind of mentality. You know, send us anything. We don't care how badly it's written, we just want information. We will take it, we will mold it, we will get that rough piece of clay and we will fashion it into something that's presentable, and then that will appear in the AFTE newsletter.

That has evolved into a much more formal process with requirements for the type of documents that should be submitted, the kind of computerization that should have been used.

And then they have a much more elaborate system of editors, where they have some -- they have one main editor and they have some associate editors, and then they have people down in the hierarchy below them. But it remains -- it remains AFTE members that edit according to that formal process.

And I know that there are other journals that have some editing done by people outside of the -- of the profession. And I know that some other editing can be much more cutthroat. For example, people doing certain kinds of research for -- for cancer, for example, whoever comes up with a cure will be heralded as somebody that has done something

really special.

And so those people that write and do research in that area have a lot of their papers edited by people doing competing research, and so they are extremely critical.

But my experience with the AFTE editor process is that they are very critical, also, especially since -- since Daubert. Because -- and I'm glad that the Daubert criteria were formalized, because I think for far too long, people --

MR. BURT: I object at this point. I think we're into a narrative that's not responsive.

THE COURT: If you would, just try to focus on the question that was asked.

THE WITNESS: Yes, I will. Thank you.

BY MS. MOTT:

Q. Well, let me follow up on a couple of things.

One, obviously, your PowerPoint presentation is designed to talk about the factors of Daubert.

A. Right.

Q. Now, you've also written regarding that and the firearm and toolmark field. Isn't that right?

A. Yes.

Q. And what have you written, in terms of

specifically addressing Daubert? And I believe it's entitled "Firearm and Toolmark Identification, Meeting the Daubert Challenge." Is that right?

A. Yes.

Q. And that, for the reference, is Exhibit 3 in Binder Number 1.

And I'd like to draw your attention to page 6 on that -- in that article, and it discusses the premises put forth.

Could you explain a little bit about that and how you -- I know you briefly went over it in the PowerPoint -- but in a little more detail?

A. Yes, I will. I'll be glad to do that.

This paper was written by myself and co-author Richard Grzybowski. Richard spells his name G-R-Z-Y-B-O-W-S-K-I.

We wrote this in the AFTE Journal in winter, 1998.

On page 6 we have repeated what Michael Saks -- spelled, S-A-K-S -- said that we had to do to meet the Daubert challenge.

Michael Saks is -- he's an academic, but he is -- he has a very keen intellect. He's been the editor of our chapter in "Modern Scientific Evidence" for all of these years, ever since 1997. And he

has -- he has held the comparative evidence field feet to the fire all during that time.

He's been a critical commentator. But at the same time he has -- he was -- he did a very constructive job of editing the chapter that Biassoti and I wrote in '97.

So I think he recognizes the value of what we do, he just wants to ensure that we do it right and that the results are reliable.

Saks described in detail what we should do to meet the Daubert challenges. He said our ability to do that would depend on whether we meet three premises. And so in this paper, Richard and I listed his three premises and then stated why we felt that we could -- we meet them.

Should I go over those?

Q. What are each of the premises?

A. Premise Number 1 is that many kinds of physical entities exist in a unique one-of-a-kind form.

Premise Number 2 is that they leave correspondingly unique traces of themselves.

And Premise Number 3 is that the techniques of observation, measurement, and inference employed by the forensic identification sciences are adequate to link these traces, that is, toolmarks, back to the

one and only object that produced them.

Q. And so your co-authorship of this article, was that just based on you two and your experience and training, or did you actually look at other studies and make a response to those three premises?

A. No. This article by Grzybowski and Murdock was based on -- this is our view.

Q. Based on your however many years of training and experience and knowledge?

A. Yes. Based on our -- at that time it was probably 60 years' worth of training and experience.

Q. And what was your response to those three premises?

A. Well, with regard to Premise Number 1, through our knowledge of the effect of manufacturing processes on class and subclass features, we felt that we are able -- examiners are able to determine whether or not unique individual features, one of a kind, are present on tool working surfaces. So in that way, we meet his first premise.

Premise Number 2, by determining that unique working surfaces of tools leave reproducible toolmarks, we determined that objects leave unique traces of themselves. Trace is synonymous with toolmarks, and so we -- we meet his second premise.

In his third premise, we meet it in two ways. A lot of the comparison of toolmarks is done by an examiner's ability to recognize agreement, similarity, and patterns. And that's called -- that's generally referred to as pattern matching.

And through training and experience, arduous comparisons of known non-matching toolmarks, examiners build up in their own mind what it takes to make an identity of toolmarks.

There are other people that quantitate the amount of agreement that they see in striated toolmarks. Remember, I said there were two kinds of toolmarks, striated and impressed.

Those people that quantitate the agreement that they see in striated marks have an additional feature, a quantitative feature, that they can use to satisfy the third premise.

Q. Very good.

Now, I believe you wrote another article with Mr. Grzybowski. And I know I'm probably not pronouncing his name exactly correctly.

And I believe that was "Firearm and Toolmark Identification, Passing the Reliability Test Under Federal and State Evidentiary Standards."

Is that also an article that your name is

upon?
A. Yes. My name is on the article, along with Richard's, but there are four other names. And it's important that I mention those names.
Q. And just for reference, that is Exhibit Number 5 in Binder 1.
A. And those names are Bruce Moran, M-O-R-A-N; Ron Nichols, N-I-C-H-O-L-S; and Robert Thompson, T-H-O-M-P-S-O-N.
Q. And why are those people important to mention?
A. Because they're co-authors, and they deserve to be mentioned.
Q. What are their fields of expertise?
A. They're all firearms and toolmark examiners.
Q. And all of those have also written extensively in other areas of the field?
A. They have.
Q. And in fact, has Mr. Nichols published a review of the literature in the field?
A. Yes. He's done -- he's done two or three reviews over the years.
Q. And so is there a part one, part two, and part three?
A. Well, there's a part one and two, certainly. But he's written some other reviews that are not

being introduced here.
Q. The ones that I am discussing, part one and part two, what does that encompass, if you know?
A. In part one and part two, he summarized the empirical studies and some validation studies. He also summarized some -- some theoretical and some mathematical studies that have been done in our field.
The first part one article he wrote before we formulated the AFTE theory of ID.
Q. And that, for reference, is our Exhibit 50. And that is in Binder 4.
MS. MOTT: And I apologize for it being a little bit out of place, but that was something that we discussed late on. And it was included because of its importance, according to Mr. Murdock.
BY MS. MOTT:
Q. Is that correct?
A. Yes.
Q. Now, Mr. Nichols has also written another article that has come to numerous Courts' attention, and that is "The Scientific Foundations of Firearms and Toolmark Identification and Response to Recent Challenges."
Are you familiar with that article?

A. I am, indeed.
MS. MOTT: And for reference, Your Honor, it is Exhibit Number 6 in Binder 1.
BY MS. MOTT:
Q. And if you know, sir, what was that article -- well, let me rephrase that.
What was the significance of that article?
A. After the 2009 NAS report, there were some criticisms that were leveled at our field, saying that it was not scientific and that the result should not be admitted into courts. And that was -- there were about two or three people.
Ron wrote an article responding to those criticisms in a professional way, and that was published in the California Association of Criminalists newsletter.
Subsequent to that, he wrote the article that you just referred to, that was published in the Journal of Forensic Sciences. And he responded specifically, I believe, to the criticisms of Adina Schwartz, who the Court will hear from tomorrow, I believe.
Q. Now you mentioned within that, the scientific method, so let's -- let's kind of back up and let's talk about that a little bit, which you also

discussed in your PowerPoint.
And one of the things that you discussed was the AFTE standards and the AFTE theory of identification. And in terms of that, are the principles and the theory behind this, and that are reflected in the theory of identification, how does that follow the scientific method?
A. The studies that led up to that, the creation of the AFTE theory of ID, were done either wholly or in part by adhering to the scientific method.
A lot of those studies were summarized by Ron Nichols in his part one article, but certainly not all of the studies. He doesn't list -- I mean, that is not an exhaustive list of them. Those are just the ones that he -- he elected to -- to cite and describe.
And the reason he described them, although he encourages everybody to go back and look at the original articles, he -- he summarized them so it could serve as a shortcut for somebody, examiners mainly, wanting to get an idea of what had been done in the past.
And so Ron -- Ron is a good writer, he's a very bright guy, and so he wrote -- he wrote summaries, and not just listing those articles. And

he wrote what he thought the significance was of those articles.

And -- but he did encourage -- he's a strong proponent of anyone going back to the original citation and reading the original articles.

So it was -- the AFTE theory of ID, simply put -- that was -- that was formulated by a committee that I chaired. And we simply put into words what the examiners wound up doing at the end result of all of those -- all of those studies.

We made a written description of what we thought the basis for our IDs were. And we wrote that because we felt very confident, and we still do, that we were justified in expressing it in the way we did.

Q. And as such, is that a scientific method?

A. The scientific -- no, it is not a scientific method.

Q. Okay.

A. The scientific method was adhered to, and that's what led up to the formation of that theory of ID.

Q. All right. Now, you have another article that you have written in terms of explaining the application of that scientific method.

A. Yes.

Q. And that is -- I believe also references "Zen and the Art Of Motorcycle Maintenance"?

A. It does.

MS. MOTT: And for reference, that's Exhibit 18 in Binder 2.

BY MS. MOTT:

Q. Can you explain how that article came about, and what relation are we talking about here?

A. Well, I read the book entitled "Zen and the Art of Motorcycle Maintenance," mainly because I really like motorcycles. I have all my life.

And in one of the author's chapters he describes the use of the scientific method in evaluating why a motorcycle won't run.

And I was struck by the simplicity and the straightforwardness of his description of examining the electrical system in a motorcycle, for example, and his expression of the need to thoroughly document.

So as the author said, "You need to know where you are, where you've been, where you're going. And when you get there, you need to know if you have arrived."

And that is what we do in the laboratory.

Thorough documentation is one of the hallmarks of a quality firearm and toolmark examiner.

And so I looked at his description. And the guy that I team teach with, Bruce Moran, and I wrote up what is Appendix Number 2 in the article that you have already described, "Firearm and Toolmark Identification, Passing the Reliability Test Under Federal and State Evidentiary Standards."

So our separate article appears as Appendix Number 2, and we put in there a chart illustrating the steps in the scientific method as the author outlined them in his book.

And the first column describes the use of the scientific method in determining why a lamp won't go on. So everybody -- everyone in this room uses the scientific method when they investigate problems like that. And I could go through the scientific method and describe how you determine why a lamp won't go on.

The second column is a description of the normal case in a laboratory.

The third column is what led up to the formation of the AFTE theory of ID.

And the fourth column is a discussion of criteria for identification.

And criteria for identification of toolmarks is a -- is a consideration that is separate from all of those studies that support the field of forensic firearm and toolmark identification as a legitimate scientific enterprise.

Q. Maybe it would be helpful to go through, not necessarily step-by-step in the table, but what a firearms examiner would be looking for and how, then, that method applies in a scientific way.

A. Well, you can start off by defining a problem, which is the first thing in the scientific method.

And one of the problems could be the example that I used here: Did this gun fire this bullet? Was this bullet fired through the gun barrel of this gun?

And you could formulate a tentative explanation, which is your hypothesis, which could be, no, it did not.

The best hypotheses, in my opinion, are expressed negatively.

Q. And why is that, sir?

A. Because it allows an examiner to step back a little bit from the potential influence of contextual bias.

Q. And when you say contextual bias, what do you

mean?
A. There is a potential for somebody working in a forensic laboratory, especially if it's a public service laboratory, to receive information that might suggest that the detectives feel that somebody is beyond a doubt guilty.

And that context, if you let it happen, could influence -- has a potential to influence your comparative results. Gee, if this person says -- and this is a trustworthy person -- says that this person is beyond a doubt guilty in his opinion, maybe this is the real gun.

So I think it's very healthy. It's the healthiest way to approach a forensic case, is to do it from a negative standpoint.

Q. Okay.
A. So your hypothesis in this case would be no, this gun didn't fire this bullet.

So then you perform experiments to test the hypothesis. You identify the caliber of the gun and the questioned bullet, and you compare the two to see if they are similar calibers. In other words, if the class characteristics agree.

And your predicted outcome is usually expressed in the form of if/then statements. If the

gun is a different caliber than the bullet, then the gun did not fire the bullet. So you observe the results of your experiment.

The gun is chambered for a 9mm Luger, and the bullet is also a 9mm Luger caliber.

So the conclusions from the results of the experiment are, since the gun and the bullet are the same caliber, the gun can't be excluded as having fired the bullet. Your hypothesis is, therefore, proven false.

So you go back to the drawing board and you form a new tentative explanation, hypothesis, which is: If the gun and bullet are the same caliber, the gun did not fire the bullet because the rifling class characteristics are different.

Again, you're trying to rule it out, now, by class characteristics.

You perform the experiment that tests the hypothesis by comparing the rifling impression class characteristics on the test bullets to the questioned bullet.

The predicted outcome, if/then, would be: If the rifling class characteristics are different, then the gun did not fire the bullet.

And the observed results: The test bullets

exhibit five land and groove impressions and the questioned bullet has six.

The conclusion: The gun did not fire the questioned bullet. The new hypothesis is, in fact, supported by the results of the experiment.

Q. Okay.
A. And that's the end of the inquiry.
Q. Very good.

I know you also discussed -- and briefly, in some of the description that you gave, the different interpretations, identification, individualization, and conclusive elimination.

How long, in this field, has this process been going on?

How long have people who have been firearms examiners done this process? Not necessarily AFTE theory of identification, obviously, because that came into actual being in the '90s. But...

A. You're talking about the range of conclusions?
Q. The range of conclusions and examinations, such as what you've described. How long has that been going on in this field?
A. Well, you've really asked me two questions.
Q. Two questions?
A. The kinds of examinations that I have described

have been going on that way since the examinations began. But that's how -- that's the thought process.

Now, I'm sure that there are examinations performed where somebody on the bench does not say to themselves, "Okay. I'm going to follow the scientific method. What's my" -- they just start out and they do it, and it's a continuum.

But if you break it down, they're following the scientific method like I just described. So that process has been around for a long time.

The range of conclusions, however, in addition to the AFTE theory of ID, the committee that I chaired, we formulated the AFTE range of conclusions. So it appeared, in the form that it exists now, for the first time in the early '90s.

Q. And that was designed to standardize the terminology?
A. To standardize the range of conclusions, yes.
Q. Now, you said -- the previous question.

"For as long as there has been examinations" --

A. Yes.
Q. -- "that's the way it has been done."
A. Yes.
Q. Can you give us a reference? Is that 75, 100

years?
A. It's probably 100 years plus.
Q. And kind of jumping back to literature, has there been a history of firearm and toolmark identification that has been written and published?
A. Yes.
Q. And was -- who was that by? Was that James Hamby?
A. Well, Hamby and Thorpe, they did write a very nice -- it was a history of our field, yes.
Q. And I take it there were others?
A. There have been others that have seen fit to summarize the history when they were writing, really, about something else.
Q. All right. Well, James Hamby, for reference, that article is Exhibit Number 7 in Binder 1. And I believe -- I'm going to say for the past 75 years, when that was published in 2008. Does that sound right?
A. Yes.
Q. And does that article also discuss what you've been talking about the whole morning?
A. In general, yes. It's a very -- it's a step-by-step -- it's an excellent history. It was part of his Ph.D. thesis from Strathclyde University

in Scotland.
Q. Very good.
Now, let me go back to your PowerPoint and some of the things that you have discussed and that you mentioned on the stand here.
And one of those two things was striae and impression marks.
A. Yes.
Q. Can you give us a little more in-depth, I guess, description of what exactly you're talking about, for example, with impression marks?
Where are we going to see those? Where would an examiner find those most commonly when they are doing an examination?
A. Do you want me to limit it to firearms evidence?
Q. For the purposes of this hearing, yes.
A. Well, one of the slides that I showed was a schematic which showed toolmarks that are possible on a fired cartridge case.
You can also get some of those same kinds of tool marks on unfired -- unfired cartridges that are simply worked into and out of the action of, for example, the semiautomatic pistol.
Because for whatever reason, sometimes

people will load a cartridge, decide they don't want to fire it, so then they manually pull the slide back and eject the unfired cartridge.
And you also saw a schematic of tools that are inside of a firearm. There's probably 8 or 10 or 12 different tools, different tool working surfaces, that can have the potential to mark on cartridge cases or cartridges.
So we look at the base of a cartridge or cartridge case -- let's limit it to fired cartridge cases, because those usually have the most toolmarks on them.
You look at the very base. And you can have a firing pin impression usually somewhere near the center of the primer. You can have marks from the breech face. There's a very forceful contact during firing between the flat cartridge case base and the surface it rests against, which is the breech face.
And then you have the extractor, the extractor claw, or hook, that's over the rim of a cartridge case. And then when it's fired, that has to move out and over. And when the cartridge is chambered, it moves up and into position, so it has the potential to make marks both during chambering

and during extraction.
And then you have the ejector. The ejector is that stationary piece of metal that I showed an example of. And when a cartridge case is ejected, the slide moves the cartridge case back until it strikes that ejector, which causes the cartridge case to start to pivot out of the gun, and it pivots around the lip of the extractor.
The hole surrounding the firing pin is called a firing pin aperture edge. The opening itself is the aperture, but the edge.
In a semiautomatic -- in one type of semiautomatic pistol, it moved -- the slide, after firing, moves back a short distance to where the barrel and the slide are locked together for strength. And then the barrel drops down and unlocks. Well, the cartridge case is still in -- it's still in the back of the gun barrel, it's still in the chamber, so it slides.
The primer is softer metal and it extrudes, or is pushed back a little bit, into the firing pin opening. And it's pushed back in there, and then when the gun barrel drops, some of the pushback is sheared off.
And so there's a firing pin aperture shear

mark, it is called. And there's no subclass influence from the edge of that aperture. And so those marks that are produced can be readily identified and they are very prominent, quite often.

Most of the time you have Glock-type pistols. The Smith & Wesson Sigma is another model -- S-I-G-M-A, is the model of the Smith & Wesson pistol -- that can leave very similar marks. And it's the rectangular firing pin impression that I showed on one of the slides.

The firing pin itself can have defects that can be identified in the bottom of the firing pin impression.

And then you can have a firing pin shear mark, to where the firing pin is still protruding into the impression when the cartridge case drops during unlock, and you have a teardrop-shaped mark occurring at the 12:00 position.

So there's a whole host of marks that are possible to be -- have the potential for comparison and identification with a particular tool working surface.

Q. Now, those are all impression marks that you have just described. Is that right?

A. No. Some of them are striated marks.

Q. And can you differentiate those for us?

A. So the firing pin mark that goes straight in, that's an impression mark.

Q. Okay.

A. The firing pin -- the shear, that is the mark that's at 12:00, the teardrop-shaped mark, that's a striated toolmark.

The firing pin -- the breech face mark is a stamping mark, so that's an impression.

The ejector mark is usually an impression but can be a combination of an impression, and then as the case moves it slides across the ejector. So it is not uncommon to have an ejector mark that's a combination of a compressed mark and a striated mark. In fact, it is fairly common.

The firing pin aperture mark, usually it's a striated mark. It's the shear mark. But sometimes there can be small protrusions around the mouth of the -- of the firing pin opening that can actually impress themselves into the priming material, so that's an impressed mark.

But in the latest AFTE Journal there's a very good article from those two authors from Israel that I described earlier. And they describe how that when some cartridges are being loaded into the

chamber, the edge of the rim on the base rubs against those small protrusions around the edge of the firing pin opening. And actually, you get a very nice striated mark right at the edge on the base.

Q. And I believe you said that these are all marks that you can make an identification on.

A. They have the potential. Sometimes you can have a firing pin impression that is virtually smooth, and it has no potential for positive identification.

Sometimes breech faces are so incredibly smooth that they don't leave hardly any identifiable marks.

Sometimes breech face -- breech face surfaces are so coarse that if you even work a cartridge through the action, the coarseness marks in an identifiable way on unfired cartridges.

So it all depends on the nature of the working surface and the interaction between the object marked, that is the cartridge case, and the particular tool working surface that we're talking about.

So one of the things that an examiner does is, he evaluates every fired cartridge case that they want to look at for the potential. Are there marks?

Where are they? Which ones?

And they make -- usually will make some sort of a record of that in their notes.

Q. And are those all individual?

A. They have the potential to be individual, yes. There can also be some subclass marks that are transferred over.

For example, on the firing pins that I showed the example of, should an examiner see those kind of circular marks that I had in one of my slides, that would signify very clearly that there's a potential for subclass influence. And if you hope to identify that firing pin impression, you better find some irregular detail that you think is unique.

Breech faces also have the potential to have subclass markings.

There's a really good article by Gene Rivera in the AFTE Journal, and it was on Smith & Wesson pistols. And he showed very clearly that there were subclass features. But those marks on those breech faces have the hallmarks of subclass influence. They were marks that started on one side of the breech face and continued in a parallel fashion, virtually unchanged, all the way over to the other side.

That's a red flag. The examiner sees that, right away the lightbulb goes on and they think, "I think I may be dealing with subclass features here."

Q. And you've mentioned before that those need to be eliminated before you can make an identification.

A. Correct. You cannot identify a toolmark if there's subclass influence present.

Q. Now, has there been, also, numerous studies on subclass?

A. There have been a lot of papers written that describe various types of subclass influence. And Ron Nichols has authored a list. I think there's in excess of -- about an eight-page list. There's an excess of 90 of those references that he lists there.

The article that I just described by Gene Rivera is an example of an article that -- he discovered this subclass influence, he took photographs, he published that.

Why did he do that? Not just to gain individual recognition, which he certainly did because he published it, but to let people like me know of the existence of that.

So it's -- so it's a warning sign.

Q. And in fact, isn't there a bibliography that was done on all of those studies in terms of

subclass?

A. Yeah. That is the eight-page list by Nichols that I described.

MS. MOTT: And for reference, that is Exhibit 19 in Binder 2.

BY MS. MOTT:

Q. Now, I know we've talked a lot about subclass and identification and all of that. And then, obviously, a number of studies on subclass.

Have there also been studies in regards to, for example, consecutively manufactured firearms, and if there's able to be an identification -- or excuse me -- or if there's able to be discernible individual markings that differentiate consecutively manufactured firearms.

Are there studies on that?

A. Well, there usually aren't studies on consecutively manufactured firearms. Because the way that manufacturers assemble firearms, they can assemble them from a number of parts.

They make parts, they put the parts in bins, and then -- and then factory workers will get extractors and firing pins from these different bins.

We focus on the individual tools that are contained inside of the firearm. And we go to a lot

of trouble to make sure that we can ensure the integrity of a series of consecutively manufactured tools.

Some of the tools are firing pins, extractors, the ejectors, and consecutive-manufactured breech faces.

Q. I was referencing -- there was an article that we've discussed on the identification of bullets fired in 10 consecutively rifled -- which is different, I know -- 9mm Ruger pistol barrels.

A. Yes.

Q. And that involved 507 participants from 20 different countries?

A. Yes.

Q. So what was the purpose of doing that, what you were just talking about?

A. That's an example of a -- well, it's an example of two things. It is an empirical study to look at the effects of consecutiveness, consecutive tooling. In this case, it would be consecutive rifling.

Those gun barrels were all rifled according to a cut rifling process, where a broach was used in order to cut the rifling.

And then what the authors did -- I believe Jim Hamby is one of the authors of that study that

you just cited -- he took an initial study by David Brundage, B-R-U-N-D-A-G-E, who did it in connection with his master's thesis. And he sent it out to approximately 30 or 40 examiners, I think, sometime during the '90s.

Jim Hamby then borrowed those slides, made about 240 additional sets of unknowns, and then he opened the validity study up to not only people from the United States, but from the international community as well.

I believe now he's got over 600 responses from 23 different countries. So he's gone -- he continues to go beyond the boundaries of that -- that that article reports.

So initially it was an empirical study to look at consecutively rifled barrels.

It then transitioned into a validity study, designed by the author where -- where they made up a number of kits. A number of kits were sent out along with an answer sheet, and I believe there were 15 unknowns from -- from those -- I think a total of 10 gun barrels.

And then the people that are -- so this is an example of a declared test that's blind and that, of course, they don't know what the results are until

they notify Hamby what their results were, and then he lets them know whether they were correct or not.

MS. MOTT: And for reference, that's Exhibit Number 11 in Binder 2.

BY MS. MOTT:

Q. And in fact, within here he references a study that you conducted, I believe, in 1981. Is that correct?

A. Yes.

Q. And on consecutively button rifled .22-caliber barrels. And was that also an empirical study or...

A. Yes, it was. I did not make up any test sets and I didn't send them to anybody. I was exhausted by the time I did my empirical testing, so I didn't go any further than that.

Q. Well, other empirical studies mentioned in that were also from Biassoti.

A. Yes.

Q. And I know there was one that he did in 1955. Is that right?

A. Yes. He -- he wrote his -- that was the date of his -- his master's thesis at the University of California at Berkeley, under Dr. Paul Kirk.

And he studied -- I think they were .38 special. He studied lead bullets and he studied

copper-jacketed bullets.

And I believe he had 24 guns, most of them -- about eight of them were new and the rest of them were used. And he then compared those, and he did two things.

He either compared them to find a percent matching in known non-matches and known matches. But he also looked at runs of consecutive matching striae. And so his was the earliest work done on the quantitation of consecutive matching striae.

Q. So since his major empirical study, obviously there have been numerous empirical studies done since then.

A. There have been, yes.

Q. Okay. Now, you also talked in your presentation about error rates.

A. Yes.

Q. And how over the years different people have basically crunched the numbers, and you reported several of those articles or studies on the error rates.

A. Yes.

Q. And within that, you also discussed CTS, or proficiency tests?

A. Yes, I did.

Q. And the proficiency tests that are given by CTS, are those blind?

A. They're blind, in the sense that the -- that the test taker doesn't know the answer. They are declared tests. The person knows they're being tested.

Q. And do they have limitations other than what you have just discussed?

A. They have limitations in several ways.

One is that they are easier than a lot of real cases in the laboratory.

Q. And why is that?

A. CTS sends out original samples to anyone that wants to purchase them.

And since they send out original samples, most of them are in very good condition. The test marks are cleanly made, the bullets are fired in a recovery media where they are not damaged.

We get it -- it's not uncharacteristic to get objects that are very damaged from crime scenes. They have either been run over or smashed in some way, or they've been corroded by environmental factors.

The CTS samples can't be made to mimic borderline cases, because how do you make 100

borderline cases that are alike? You can't do it. It's impossible.

So about a year ago, I -- I approached the AFTE board of directors, and I asked them to request that CTS use high-quality polymer replicas for proficiency samples for our field. This method of producing proficiency samples has been in use in Europe for a number of years.

They produce extremely high-quality samples, and they can mimic -- they can take a borderline case, for example, and they can make 100 copies of that. So -- and they have done this. I think they did it in '05 and '09. They sent out many of these and determined the false positive error rate as a result.

So that would be a way that we could get a more reliable error rate from the CTS proficiency tests.

And my understanding is, recently I was notified that -- that the AFTE board of directors has approached CTS and has asked for that. And so I'm hopeful that we will have -- we'll have harder proficiency tests, there's no question about it. But we'll have ones that do a better job of mimicking the real evidence that comes into forensic laboratories.

Q. Are proficiency tests required?
A. They are required if you are an ASCLD/LAB accredited laboratory, and most labs in the United States are. So they do require you to take an annual proficiency test in whatever forensic subspecialty you work in.

The other problem with CTS tests is that the answers are all the same for every test. So if you get four people in a laboratory, they have to be very careful not to share your answers.

When I do my work, for example, I don't leave my notes out on the desk. I take notes, I take photographs, I put them in a file folder, and they go in my desk. I don't want anybody inadvertently just looking at my notes that might be working on a similar proficiency test.

And we don't discuss it. The results are completed, they're handed in. And ever since 1998, I believe, there has probably been a technical peer review done of proficiency tests, which is the way the cases go out of the laboratory. So proficiency tests should be subjected to technical peer review.

Q. But for now, the type of test that you were describing, that's what's available and that is what is administered?

A. Yes.
Q. Would that be something comparable to, for example, a standardized test that every student takes?
A. Yes. Yeah, I think so.
Q. So someone with your experience and someone who is just starting are going to take the same test?
A. Yes.
Q. Now in terms of error rate, some of the other criticisms, I guess you could say, that have come up in terms of error rates for the firearm and toolmark field also deal with random match probability?
A. Yes.
Q. And is that possible in terms of this field, to determine random match probabilities?
A. Shall we define what random match probability is first?
Q. Let's start there. Yes. Thanks.
A. Random match probability, or RMP, is the quantitative chance that you could find another tool or another firearm that would leave a mark that could be misidentified with the evidence that you are working on.

Random match probability is used to a very refined extent in the mathematical determination of

association results in DNA analysis.

It's essential that they use that because they work with subclass characteristics, so they have to develop these mathematical estimates of likelihood, of strength of association.

We work with individual characteristics and maniacally try to eliminate subclass characteristics. But it is not like my field has been indifferent to the need to develop random match probabilities.

As early as the 1930s, there has been a call for what is the likelihood that you could find on two different breech faces the same small array of irregularities?

Or what's the chance of finding another hammer face, like the one that I illustrated in my PowerPoint, that made the -- made the mark in the soft lead?

What's the chance of finding another hammer face with all of the same accidental characteristics, or even -- even some of them. I illustrated about five areas that matched.

Q. Right.
A. And random match probability would be a mathematical estimate of the likelihood of finding another hammer face that would have that same array

of matching irregular features.

The need for that in my field has been expressed by various authors ever since 1930. That's been expressed in -- I just wrote a small paper on that, and there's about 13 references that -- where people expressed the need for that.

We have not been able to develop any type of RMPs. So our -- the strength of our association at this point is not mathematically -- is not mathematically estimated.

But I am hopeful, with the advent of the 3D technology, such as confocal microscopy, that I am hopeful that in the future we might be able to come closer to developing RMPs for the kind of toolmark comparisons that we make.

Q. So for now we have proficiency tests and error rates developed from those. Is that right?
A. That -- although it's admittedly not the best, that's about all we have to work with. I think that it's virtually impossible to determine an error rate on the day-to-day work that comes out of a forensic laboratory.
Q. A best estimate for the field in general?
A. Yes.
Q. What would the error rate be?

A. Well, I -- I expressed it earlier. In the collaborative paper, the paper that was written by -- by about five or six of us in 2003, we did a survey from '79 to 2002 for firearm false IDs, and they were 1 percent.

And for the non-firearm toolmarks, started in 1981 through 2002, those were 1.4 percent.

And those figures appear in the footnote in that paper.

Q. Okay.

A. I applied for and got the original records from CTS, and that's where we got the information from.

Q. Now, was there not a study by Peterson and Markham that had -- if read one way, had a higher error rate?

A. Yes.

Q. And can you explain that, what that study was about, and give us an idea of how that worked out?

A. Well, they analyzed the same CTS proficiency data. And if you include inconclusives, if you say that an inconclusive result is an error, then the results were -- were dramatically higher, something like 12 percent for firearms, and it was into the 20s, 24 or 26 percent for non-firearm toolmarks. But we don't -- I personally, and most other people

don't, view inconclusives as an error.

I think that -- I am particularly interested in the worst kind of error that can be made, and I think that's the error that courts are interested in, and that's a false positive.

What's the percentage of time when you identify a firearm that you're wrong, or identify a tool that you're wrong?

Q. So that would be the error rate that you had just discussed previously?

A. Yes.

Q. Let me skip up to -- I know you had talked about the 2009 NES report and the criticisms that came out about that.

There was also a 2008 report, was there not?

A. There was.

Q. And are you familiar with that?

A. I am.

Q. And if you know, how was that created, and what was the nature and purpose of that report that came out in the committee?

A. The 2008 report is referred -- is referred to by -- by our profession as the NRC report. And it was a report on -- that accessed the feasibility,

accuracy and the technical capability of a national ballistic database.

They were asked to determine whether or not it would be possible to take all guns made in the United States, and possibly all guns imported, perform test firing to take those -- those specimens, enter them into the automated machinery that existed then and still exists, and maintain a database of the signatures such that at any time anywhere in the United States if a gun is used, we would have this database so we could compare these firings left at a crime scene and we could go back and find the specific gun that was used.

They determined -- I'm sorry.

Q. Go ahead.

A. They determined that it was not feasible, that it wouldn't work.

And AFTE doesn't have any quarrel with that.

During the production of their report, however, they made some statements that were -- that were demeaning of the work that we do, identifying firearms and non-firearm toolmarks.

And so in 2008, my committee authored a report that was reviewed and approved by the AFTE

board of directors. And it was a response of AFTE to the 2008 NRC report on ballistic imaging.

MS. MOTT: And for reference, that is Exhibit 13 in Binder Number 2.

BY MS. MOTT:

Q. And could you summarize what the response was about?

A. Well, we took exception to three statements that they made.

And then -- well, we actually took exceptions to probably one and a half. We agreed with the -- with the third conclusion, and I'll start with the one that we agreed with.

The NRC Conclusion Number 3 was that conclusions drawn in firearms identification should not be made to imply the presence of firm statistical basis when none has been demonstrated.

And we agree with that.

Even though the AFTE theory of ID clearly states that examination comparisons and IDs are made to the practical -- the -- they're made to a practical impossibility, not absolute.

The way that reports are written and the testimony that is given can give the Court or the user, the client, an impression that the comparisons

are absolute. And there's no question that examiners used to do that.

So we agreed wholeheartedly with their admonition. And a lot of laboratories, including the one I work in, have taken steps to include wording in our reports of toolmark identifications, that these identifications are made to the practical and not the absolute exclusion of other guns or tools.

Q. What about the other two?

A. Well, the other two -- one of their conclusions reads as follows:

"Underlying the specific tasks which the committee was charged is the question of whether firearm-related toolmarks are unique. That is, whether a particular set of toolmarks can be shown to come from one weapon to the exclusion of all others.

"Very early in its work, the committee found this question cannot now be definitively answered."

The second conclusion that they came up with was: "Additional general research on the uniqueness and reproducibility of firearm-related toolmarks would have to be done if the basic premises of firearms identification are to be put on a more solid scientific footing."

And we also generally agreed with that. Continued research is very important. The scientific enterprise depends on a continuum of research. Even though you have extensive research and you're able to develop a theory, which is the end result of lot of research that shows the same thing, you shouldn't be content with that.

You should continually test those theories to see if they stand up in light of new information. So we agree with that, too.

But what we also say is that in our opinion, there has been sufficient research and validation done in our field that supports our ability to come to courts like this and express that certain tools are responsible for making certain types of toolmarks, to the practical exclusion of other tools.

Q. As a followup to your question that you agreed that continued study should be done, isn't that a basic tenant of every scientific method --

A. It is.

Q. -- that science does not stop when a conclusion or a hypothesis has been made?

A. That is correct.

Q. It continues?

A. Yes.

Q. Now as for the committee on that 2008 report, do you know if there were any firearm or toolmark examiners on that committee?

A. There were not. They deliberately excluded firearms and toolmark examiners.

Q. And did the report even make a decision on the reliability and validity of firearm and toolmark identification?

A. On page 18 of their report, in the section entitled 1-812, entitled "Limitations, what the committee does not do," they say in the second paragraph:

"First and most significantly, this study is neither a verdict on the uniqueness of firearm-related toolmarks generally, nor an assessment of the validity of firearms identification as a discipline."

And then continuing on page 20, at the beginning of the first indented paragraph they say:

"Third, the purpose for this study explicitly precluded the committee from accessing -- assessing the ability of forensic firearms evidence in court, either generally or in specific regard to testimony on ballistics imaging comparisons."

And at the end of that paragraph they say:

"However, we do not in any way offer a determination of whether ballistics evidence should or should not be admissible in court proceedings."

MS. MOTT: And just for reference, that is Exhibit Number 10 in the first binder, and it is the very last page.

BY MS. MOTT:

Q. Now, do you know who the chairperson of that committee was -- is?

A. Yes. It was -- his name is John Rolph, R-O --

Q. And are you aware --

A. I had the spelling, I thought, but I stopped because I am not sure of the spelling, but I can get it.

Q. R-O-L-P-H. Does that sound correct?

A. Yes, it does. Thank you.

Q. And are you aware if he wrote an affidavit regarding the limitations of that committee?

A. He did. He wrote an affidavit on that.

MS. MOTT: And for reference, Your Honor, that is Exhibit 8.

MR. BURT: Judge, I do have an objection to testimony about these affidavits. There's a number of them in the exhibits. And although I haven't had

time to review all of them, I am familiar with this particular one.

And it's my understanding this is an attempt to impeach the thrust of the report which was written by this committee.

The affidavit that Counsel is going to reference was written in connection with some litigation in the District of Columbia.

And unlike the literature that's being offered, which I think the Court should consider, I would ask the Court not to consider affidavits that were prepared in other cases, because it's taking out of context the whole group of information that was relevant in the case being referenced.

In other words, this Rolph declaration was rebutted, so there are counter-declarations to this declaration. And I think it gets far afield of what the Court should be focused on, which is what is in the report, not what Dr. Rolph said years later about what he thinks the report says.

The report speaks for itself. And this affidavit is an attempt by Dr. Rolph to put a spin on it that is favorable to the position advocated by the government.

And it's my understanding that this witness

actually may have participated in drafting, or at least compiling, some of these affidavits.

So it's a litigation-produced document, and it is misleading unless the Court is going to take into account the counter-affidavits and the testimony that was developed in that other case, which I think is fairly voluminous.

So I object to this particular affidavit.

THE COURT: All right. Thank you.

Ms. Mott, what's your response? And -- and how is Dr. Rolph's affidavit useful in this case or relevant in this case?

MS. MOTT: Well, Your Honor, first of all, I'm not sure which witness Mr. Burt was talking about, if he was talking about Mr. Murdock or he was talking about Dr. Rolph.

THE COURT: I understood him to be talking about Dr. Rolph's affidavit, Exhibit 8.

Is that right?

MR. BURT: Yes, Your Honor.

MS. MOTT: This affidavit was prepared in the case of United States versus Edwards. And it was as a followup to the actual limitations that were placed within the report.

And he expanded on those limitations in his

affidavit because of the criticisms that came forward after the 2008 report, that somehow this was a definition of the nonvalidity of firearm and toolmark identification, which was obviously not the case based on the report itself. And --

THE COURT: So then how is this affidavit helpful, if it's information that -- or it refers to information or expands on information that was contained in the last page of the report?

MS. MOTT: It's helpful, Your Honor, to know, from the chairman of that report, that that was what they meant in that report, was that it was limited, and it was a limited basis, and it did not assess the reliability or the validity of firearm and toolmark identification.

And it's for that purpose only, and the Court can take it for whatever weight you would like to give it.

THE COURT: And I haven't had a chance to actually review the affidavit. But Mr. Burt's other comment was that it is the result of facts that may have been, maybe, applicable in the District of Columbia case. And to the extent that the facts may have influenced the information that is contained in the affidavit, how does that help us in this case?

MS. MOTT: Well, Your Honor, what the government is presuming is that when Ms. Schwartz is presented by the defense, that she is going to hold up this report as an attack on the validity and reliability of the field of firearm and toolmark identification.

So the only purpose that this has for the affidavit is that it was responding to the same sort of attack in that case. And therefore, the chairman felt that it was necessary to stress that the limitations that the committee had still held true and that it was not an assessment of the field in total, on the reliability and validity of it.

And so therefore, it is offered by the government because that is what we fully expect Ms. Schwartz to say.

THE COURT: All right. Anything further?

MR. BURT: Judge, just that we offered the entire report to the Court in support of our motion.

We didn't characterize it as an attack on anything. We characterized what the report says.

The report itself says what the limitations are, so it appears that we're addressing an issue that has already just been addressed in the report itself.

And again, it gets us into side issues about how this declaration got drafted and what the counter-declarations were. But I don't think it's going to be helpful because the Court has the report in front of it, the entire report.

The report, as this witness just said, states its limitations. So I think that's the important point that's getting across here.

And to go beyond that, into what Dr. Rolph said years after this report was published about what his intention was, when he's just one author of many in this report, I think it really gets us sidetracked.

And I think it's a 403 issue at this point.

MS. MOTT: Considering that the affidavit actually -- you know, if the Court does review it, finds there's no factual basis in that regard -- in regards to the case of United States versus Edwards at all, it deals primarily and focused on the report that was issued as he was chairman.

And so for that purpose, Your Honor, it does go and expands on the limitations and reiterates the limitations that the report had, and that it was not an assessment of the reliability and validity of the field in general.

And that is what it's offered for. And there's nothing else in there in terms of this was a back and forth or this is specific to this factual basis of this case. It is specific to the 2008 report.

And we would offer it as -- for whatever weight the Court would like to give it.

THE COURT: I'll allow Mr. Murdock to testify about this affidavit and -- and I think the consideration of the objection is more on the weight that the Court should give the affidavit as opposed to whether or not it's admissible. So I will allow Mr. Murdock to testify about the affidavit.

MS. MOTT: Thank you, Your Honor.

Once again, just a point of reference, it is Exhibit 8 in Binder 1.

BY MS. MOTT:

Q. And have you read the affidavit by Dr. Rolph?

A. I have.

Q. And what we were just discussing, does he kind of reiterate what those limitations were for the committee and what they were purporting to do?

A. Yes, he certainly does that. And he also goes beyond that, to indicate what their other conclusions were, one of which was that we are not -- we should

not be making absolute -- the absolute associations of toolmarks.

So he not only reiterates what the limitations are as they appeared in the exhibit before this that we introduced, but he reiterates their cautionary statements as well.

But he does something that I think is very significant, which we haven't talked about, which is Point Number 10.

And incidentally, this report is dated not years after the initial report, it's the same year that the initial report was done.

MR. BURT: Your Honor, I'm going to object and move to strike that. That answer is responsive to my objections, not to a question being asked. It's a piece of advocacy on the witness' part. It has nothing to do with the question being asked.

I'd move to strike that.

THE COURT: Mr. Murdock, please try to limit your answers to the question that is put to you.

THE WITNESS: Yes, Your Honor.

BY MS. MOTT:

Q. So Number 10 expands on that limitation of the committee, does it not? Or I should say further

explains.

A. Yes.

Q. And in doing so, Dr. Rolph talks about the admissibility of firearm-related toolmark evidence. Is that right?

A. Yes, he does.

Q. And does he say whether or not the report from 2008 is a commentary on whether or not that type of evidence should be admissible in court?

A. Well, he says it's not a commentary on the admissibility.

But then he goes on to say that: "Statements on toolmark matches, including legal testimony, should be supported by work that was done in the laboratory by the notes and documentation made by examiners and by proficiency testing or established error rates for individual examiners in the field and in that particular laboratory."

And we agree wholeheartedly with -- with that. That work -- the conclusions that we express in court should certainly be supported by well -- well-documented cases that clearly explain the basis for the conclusions reached.

Q. So particular to the facts of that case, if it's admissible or not is determined by what was done

in that case?
A. In any particular case, yes.
Q. And specifically, that report was on the national database. Is that right?
A. Yes.
Q. And not with individual police work.
A. Yes.
Q. Now, are you also familiar with the 2009 NAS, which is the National Academy of Science report?
THE COURT: Well, it sounds like you're going on to a new subject, so this will probably be a good time for us to take our lunch break.
I'm -- it looks like I am going to have to break for the day today at 4:30. So instead of an hour and a half for lunch, is an hour and 15 minutes okay with everybody?
MS. MOTT: That's fine, Your Honor.
MR. BURT: That's fine, Your Honor.
THE COURT: We'll return at 1:15.
(A recess was taken from 12:00 noon to 1:20 p.m.)
THE COURT: Please be seated.
We're back on the record in USA versus McCluskey.
Are we ready to continue?

MS. MOTT: Yes, Your Honor. Thank you. We should be able to wrap it up here shortly, hopefully.
BY MS. MOTT:
Q. Just a quick followup question, Mr. Murdock. We were talking about the 2008 NRC report, and then obviously the response by AFTE.
And if you recall, who were the authors of that response? I know it was an AFTE response, but were there specific authors of that?
A. I was the -- I am the chairman of the committee that wrote this response. The response, however, was reviewed and approved, and I believe edited some, by the AFTE board of directors.
Q. Now, moving on to --
MS. MOTT: And I'm sorry. For the reference, that was Exhibit 13, the response to that report. And that's in Binder 2.
BY MS. MOTT:
Q. Moving on to the 2009 National Academy of Sciences report, which was entitled "Strengthening Forensic Science in the United States, A Path Forward" --
MS. MOTT: Which, for reference, is Exhibit Number 1 in Binder 1.

BY MS. MOTT:
Q. And are you familiar with that report, sir?
A. Yes.
Q. And do you know how that report was created?
A. Well, it was the end of a multiyear investigation by the committee on virtually all forensic science specialties. So it was intended to be an overarching report on the forensic science enterprise.
Q. And do you know for what purpose other than, for example, whether it would be submitted to Congress, or what was the purpose of the report?
A. Well, it is -- as the title indicates, it was supposed to be a roadmap to strengthening forensic science. And it was actually forensic science that asked this -- this committee to be formed in the first place.
Q. Do you know who served on that committee, in general?
A. Well, I know it was a distinguished group of men and women from -- mostly from science, although there were a number -- I believe there were a number of attorneys on there. There were, in addition, four forensic scientists, none of whom had any experience in firearms and toolmark work.

Q. That was my next question. So thank you.
Does that report, then, obviously address the science of firearm and toolmark identification?
A. It does.
Q. And I believe there were numerous recommendations made in that report. Is that right?
A. There were 13 altogether.
Q. And so for reference, I believe the pages applicable to -- well, let me ask you this.
Were there specific recommendations that are applicable to the firearm toolmark identification field?
A. AFTE felt that there were 6 out of the 13 that were -- that were related to the firearms and toolmark field.
Q. And for reference purposes -- and correct me if I'm wrong, sir -- those are on pages 2, 3, 6 -- or excuse me. The references, the recommendations, let me rephrase that -- are Number 2, 3, 6, 7, 8, and 9?
A. Yes.
Q. Now, can you tell us what Recommendation Number 2 is?
A. Yes. And if I might refer to the response of AFTE?
Q. Yes, sir.

A. Recommendation Number 2 was that there should be established terminology to be used in reporting on and testifying about the results of forensic science investigation. Similarly, they add it should establish model laboratory reports for different forensic science discipline and specify the minimum information that should be included.

Q. And does the science of firearm and toolmark identification meet that requirement or recommendation?

A. Well, our response is that in 1980, AFTE established an extensive glossary of terms and definitions which covered all phases of firearm and toolmark work. And that document which is, incidentally, being revised at the moment, has served to standardize terminology and statements that can be rendered as conclusions in the reports.

We do not, however, have standard report -- reporting wording.

Q. And for reference, you are reading from -- referencing from the response to the 2009 report. And that's Exhibit 12 in Binder 2?

A. Yes, I am.

Q. So you had established the glossary on standardized terminology and range of conclusions.

So what does Recommendation Number 3 deal with?

A. Recommendation 3 deals with -- they say that research is needed to address issues of accuracy, reliability, and validity in the forensic science discipline. And they actually broke it down into four -- into four parts.

Part A was establishing the scientific basis demonstrating the validity of forensic methods.

B is the development and establishment of quantifiable measures of reliability and accuracy of forensic analyses.

C is the development of quantifiable measures of uncertainty in the conclusion of forensic analysis.

And, four, automated technologies capable of enhancing forensic technologies.

Q. And so does the science of firearm and toolmark identification meet this recommendation?

A. We meet some of them. There is an extensive body of research going back over 100 years, that we've already talked about, which in our opinion establishes the accuracy, reliability, and validity of the conclusions that we reach in firearm and toolmark identifications.

I listed some of that research on the -- on the PowerPoint slides that I showed, and there will be other references that will be introduced in a few moments -- or in a few minutes.

Q. So moving on to Recommendation Number 6, what is that?

A. Recommendation 6 said that the forensic specialty should develop tools for advancing measurement, validation and reliability, information sharing, and proficiency testing in forensic science, and to establish protocols for forensic examinations, methods, and practices.

And they went on to say that standards should reflect best practices and serve as accreditation tools for laboratories and guides for the education, training, and certification of professionals.

Q. And I know we've discussed some of that in terms of the standards of AFTE and their certification and training. But as a whole, does the science of firearm and toolmark identification meet this recommendation?

A. Well, in addition to those two things that you have just mentioned, AFTE facilitates the exchange of information annually by holding annual training

seminars and the quarterly publication of a peer-reviewed scientific journal.

And they have adopted documentation standards. They actually adopted them in 2005, and they were published in the AFTE Journal in 2006.

And AFTE actively collaborates with the scientific working group for firearms, and that is SWGGUN, in the development of protocols, but also in the periodic review of established ones.

Q. Moving on to Number 7, what is that recommendation?

A. They say the laboratory accreditation and individual certification of forensic professionals should be mandatory and that certification should include, at a minimum, written examinations, supervised practice, proficiency testing, continued education, recertification procedures, adherence to a code of ethics, and with effective disciplinary procedures.

Q. Once again, we have discussed the AFTE ethics standards and the enforcement procedures. And I believe you've discussed how that has put into place due process --

A. Yes.

Q. -- that goes with ethics violations or

perceived ethics violations.
A. Yes.
Q. Is there anything else that we need to talk about in terms of how the science of firearm and toolmark identification meets this recommendation?
A. Well, the NAS group wanted the certification to be mandatory. I think that's a laudable goal, but AFTE does not currently make it a mandatory requirement.
Q. What about Recommendation Number 8?
A. Recommendation Number 8 is that forensic labs should establish routine quality assurance and quality control procedures to ensure the accuracy and reliability of forensic analyses and the work of forensic practitioners.
Q. Now once again, I know we've talked about standard protocols, your training program, a variety of things.
What else do we need to know to put before the Court today that shows that the science of firearm and toolmark identification meets this recommendation?
A. Well, although we've described the quality assurance measures that AFTE -- that AFTE has themselves done, what we haven't spoken about is that

AFTE endorses the quality assurance and quality control requirements of accreditation inspections such as the American Society of Crime Laboratory Lab Directors laboratory accreditation board. We heartily endorse those activities.
Q. Now earlier, you had mentioned ASCLD, and I'm probably not getting that acronym correct.
But is that what you're talking about?
A. Yes. It's ASCLD.
Q. And Recommendation Number 9?
A. It's that the forensic science group should establish a code of ethics. And they actually called for a national code of ethics for all forensic science discipline, and encourage individual forensic societies to incorporate a national code into their own organizational code.
Q. Well, we know that AFTE has a code of ethics.
In terms of your response, did you address this recommendation?
A. Not directly. We did say what you just did, that AFTE has one and a good enforcement procedure.
I, however, found myself on a committee within the California Association of Criminalists to design a national ethics code which we did do, and we submitted it to the forensic science subcommittee.

And we were hopeful that they would adopt that as a national ethics code.
But AFTE -- AFTE did not submit any code in that capacity.
Q. Very good. Now in terms of the committee itself, I know that you have discussed already that there was no firearms and toolmark examiners on this committee for the 2009 report, right?
A. Yes, that's correct.
Q. Now, was anyone from the field allowed to present before the committee?
A. Although there was no request of AFTE for a representative to make a presentation, a firearm and toolmark examiner did make approximately a one-half hour -- it was a PowerPoint presentation. I think there were 32 or 33 slides in his presentation.
Q. Do you know who that was?
A. Yes.
Q. And is he a member of AFTE?
A. Yes.
Q. But the request did not come to AFTE, per se?
A. That's correct.
Q. Okay. During his presentation, do you know if he had to share his time frame to present?
A. I believe he was representing the International

Association for Identification, and so he shared it with about a half-hour presentation on fingerprints.
Q. And that was the only time frame that you are aware of that was allowed to be presented for firearm and toolmark identification?
A. Yes.
Q. Okay. Did the committee make any statement regarding the feasibility of it performing a detailed evaluation of the scientific underpinnings of the firearm and toolmark identification?
A. Yes. They made a statement on page 7 of their report.
Q. And what did that say?
A. And this statement -- it amounts to the first sentence in the first indented paragraph on page 7. And it reads as follows:
"The committee decided early in its work that it would not be feasible to develop a detailed evaluation of each discipline in terms of its scientific underpinning, level of development, and ability to provide evidence to address the major types of questions raised in criminal prosecutions and civil litigation."
Q. So in your opinion, that by approaching their task with a self-limitation in mind, did the

committee subjectively choose to ignore extensive research supporting the scientific underpinnings of firearm and toolmark identification?
A. In my opinion, they did.
Q. Now also in your opinion, do you believe that had the committee considered this extensive research, do you believe that they would have -- what do you believe that they would have concluded about the propriety of firearm and toolmark identification?
A. I believe that they could have considered it to be valuable for proceedings such as this and that a well-established -- a culture of science exists in the field of firearm and toolmark identification.
Q. What is your overall opinion of the 2009 report, as it applies to the science of firearm and toolmark identification?
A. I think it was a well-intended effort, and I think in many respects it's exceeded -- it exceeded most people's expectations. And it served to draw attention to some -- to some areas in forensic science that definitely need attention.
And I mean when they -- when they say that additional research and training and adherence to standards and protocols is important, we wholeheartedly endorse that.

But by making the broad statements that they did without any indication of having exhaustively looked over the references that we would have submitted as an organization, that in our opinion forms the scientific underpinnings of our field, by adhering to their self-imposed limitation -- and they lived up to that.
There was no indication that they -- that they considered our references, even though they were provided with many, many references as early as June 2008 by an ex-president of our association who provided them to a member of the NAS committee, who happened to be her laboratory director.
Q. So in terms of who this person was, who -- are you willing to say who provided the references?
A. It's ex-AFTE President Ann Davis.
Q. And did she give the committee, in forming its response, what was provided to the committee?
A. Yes.
Q. And so do you know, just in general reference, how many pages or how many articles? Can you give us an idea?
A. No, I don't know. But there were hundreds of references that were provided, and there's simply no indication that the NAS committee had time or the

inclination. By their own statement they say they didn't have time, and they apparently didn't take time.
Q. So in the AFTE response -- I know, obviously, it addresses a number of these issues. Does it also address the court admissibility and/or court presentations that have reflected onto the field and science of firearm and toolmark identification?
A. Yes. We addressed that rather directly. And we did not hold back, either.
Q. And I believe that was on page 206. Is that right, sir?
A. That begins on page 206, yes.
MS. MOTT: And for reference, the response we have been discussing is Exhibit 12 of Binder Number 2.
BY MS. MOTT:
Q. And could you just summarize what you're discussing, what we're talking about?
A. Yes. On page 206, in the lower right-hand corner -- I, incidentally, wrote this, but it was approved by the board of directors.
It says: "Unfortunately some firearm and toolmark examiners performing casework today are clearly outside the mainstream of forensic

consciousness and do not conform or adhere to the current protocols and standards recommended by AFTE when conducting such examinations.
"These examiners take few case notes or other forms of documentation, like photographs, and are not familiar with the extensive amount of empirical and theoretical research that serves as a scientific basis of firearm and toolmark identification.
"Some of these examiners have been responsible for judicial rulings, wherein their testimony has been limited in some way by the Court due to their nonconformity to accepted forensic protocols.
"Those of us in the mainstream of our profession are working very hard to overcome the cloud of suspicion that has formed over all of us by the shallow court presentations of a few."
Q. And, sir, when you talk about accepted forensic protocols, are you talking about the AFTE theory of identification and the standards and the code of ethics and everything that is involved in the science of firearm and toolmark identification that makes it a science?
A. That's certainly part of it. But the

examination protocols are another big part of what we were talking about.

Q. And in terms of those protocols, were there specific things that you find to be, in terms of the scientific methodology, essential for firearm and toolmark identification?

A. Yes.

Q. And what are those, sir?

A. The documentation of forensic casework requires notes that can be reviewed by any interested party, whether it's a technical peer review in the examiner's laboratory or whether it is a skilled person hired by the defense to review casework.

The notes should be done so completely and thoroughly that any interested person should be able to determine exactly what was done and exactly why the expressed conclusions appear as they do in the laboratory report. That's just common sense for scientific recordkeeping.

Unfortunately, some examiners that didn't grow up in scientific culture or didn't have it much in school, and perhaps don't get it because of their organizational culture, they actually do casework that, by AFTE standards, is not very good.

Q. For example, taking photomicrographs?

A. I consider that essential. AFTE's documentation standard does not require photographs, but it says that that is the best way to record the agreement or disagreement, or whatever you see in a toolmark comparison.

Q. And are there laboratories that still do not do that?

A. Yes.

Q. Let me quickly move on to another response by AFTE. And that is the response to a White House subcommittee, which you briefly mentioned a couple of answers ago.

And could you tell us what that White House subcommittee was about?

A. Yes, I can.

Q. And just for time, I guess in terms of order, let me put it that way, was this following the 2009 report and response by AFTE? Is this more recent?

A. This committee was formed -- I don't know exactly when it was formed, but it is formed directly off of the White House. And it was a subcommittee on forensic science. Its acronym is SOFS, S-O-F-S.

It was formed as a direct response to the 2009 NAS report. And there were -- there were five groups, or subcommittees, that were -- that were

formed.

Q. And their purpose was what?

A. Well, they had a variety of purposes. They kind of split up all of the forensic activity. Some looked at training, some looked at ethics codes, some looked at certain kinds of forensic subspecialties, some looked at others.

The one that we responded to was called the Research Development Testing and Evaluation Interagency Working Group. And it is abbreviated RDT&E, space, IWG.

Q. And as the reason for the response, were you sent a list of questions by that group?

A. Yes. I think there's about 40 or 50 members on that -- that internal working group called IWG.

I was told by the executive secretary --

MR. BURT: Excuse me. I need to object here. It's nonresponsive at this point, and it's about to get into his speculations about what this committee is charged with, which I don't think there's any foundation for.

THE COURT: Well, the question was a fairly broad question. But I'll ask if you could rephrase your question, and if you could just answer the question posed.

THE WITNESS: Yes, ma'am.

BY MS. MOTT:

Q. In terms of your response, what types of questions was AFTE sent to respond to? What was the field or the narrow -- if it was narrow -- purpose of those questions?

A. Well, the questions weren't narrow. They brainstormed a list of 25 questions.

I was told by their executive secretary that they felt that if a forensic speciality like ours could provide meaningful responses in the way of -- of published articles with abstracts that would support answers to each of these 25 questions, that the field should be on firm scientific underpinnings.

Q. So in terms of -- after your response, is that what you did, was provide them with information that made it clear that the science of firearms and toolmark identification was on a firm scientific basis?

A. Well, there were two responses crafted to this request.

The first was accomplished by SWGGUN, and it was a 47-page response.

Then AFTE took SWGGUN's response, my committee did, and converted it to a 94-page list of

references which, in our opinion, addressed each of the 25 questions asked by this interagency working group.

Q. So for example, the second question, which is on page 8 of the exhibit: "Have studies been conducted at the manufacturing level addressing material uniformity, reproducibility, and the QA/QC procedures of the manufacturer?"

And you responded to that question?

A. Yes, we responded to it.

Q. And approximately how many references did you provide them on that subject?

A. We gave them 7 references, but one of the references alone has 47 references attached to it.

Q. Likewise Number 3, which is on page 10: "What toolmark reproducibility studies have been conducted?"

And again, references were provided on that?

A. Yes.

Q. And approximately how many references did you provide?

A. We provided them 10.

THE COURT: Which exhibit are you on?

MS. MOTT: On 9, Your Honor, in Binder 1.

BY MS. MOTT:

Q. So as it went through the 25 questions, again, you responded time and time again with numerous references to each question?

A. Yes. But it's important to add that some of these references are duplicated in more than one question, because they applied to more than one question, in our opinion.

Q. Very good. A number of the studies it appears, for example, from Mr. Hamby, Mr. Biassoti, we have discussed during your testimony. Is that correct?

A. Yes.

Q. And have you heard a response on your response?

A. Yes.

Q. And what is that?

A. Four months after we submitted the response -- this is in October of last year -- I wrote to John Paul Jones. I wrote in my capacity as chairman of the AFTE committee. I wrote to John Paul in his capacity as executive secretary of the RDT&E IWG.

And I asked him. I said, "John Paul, members of our profession go to court occasionally and we are going to be describing this reference document. And a logical question that we should get after we describe it is what, if anything, has the

IWG done with it?"

And he wrote back to me and he said, "We have plans." He said, "We have plans to hire independent experts to review -- independent scientists to review some of these articles with help from trained firearm and toolmark examiners to help interpret them."

But he said, "To do this would require a funding source to recruit these people, to transport them, house them as they're doing this work, and the funding source has not been identified yet."

And so here we are almost 14 months after we submitted this in June of 2011.

And several days prior to coming here I sent to John Paul a request for an update.

I haven't heard back from him yet. But in the one that he gave me in October of last year he said, "John, rest assured that if anything significant happens about our evaluation of your submitted articles we will let you know."

I haven't heard anything yet. And I know John Paul to be a personally responsible man. And I think that I can -- I feel confident that if anything significant would have happened that he would have let me know.

MS. MOTT: May I have just a moment, Your Honor?

Your Honor, I'd move to admit Exhibits 1 through 13, 15 through 19, and 48 and 50 at this time.

THE COURT: 1 through 13, 15 through 19, 48, and 50?

MS. MOTT: Yes, ma'am.

THE COURT: Is there objection?

MR. BURT: Just the objection previously stated to Exhibit 8, which I think the Court overruled.

And what were the other ones besides -- no other objections to 1 through 13.

THE COURT: 15 through 19.

MS. MOTT: And 48 and 50.

MR. BURT: 15 through 19, I have no objections to that, Your Honor.

MS. MOTT: 48, which is the PowerPoint presentation slides printout, and then 50, which is the review.

MR. BURT: No objection.

THE COURT: All right. Exhibits 1 through 13, 15 through 19, 48, and 50 will be admitted.

And your objection previously made to

Exhibit 8 is overruled.
MS. MOTT: Thank you, Your Honor.
I pass the witness.
MR. BURT: Your Honor, what I would like to do is proceed with the cross-examination. And then I think I will take it up to 4:30, and then I'll have a chance over the recess to look at the material that I've got, if that's permissible.
THE COURT: Sure.
MR. BURT: Thank you.
CROSS-EXAMINATION
BY MR. BURT:
Q. Good afternoon.
A. Good afternoon, sir.
Q. I see in your writings that one of the things you write about is instructing forensic scientists on how to testify.
A. I have done that.
Q. And I notice in one of your publications you advise that, you know, experts who talk too much can get into trouble.
Do you remember that article?
A. Yes.
Q. Okay. I'm going to ask you some questions. Hopefully, the answers will be clear and you'll be

able to respond directly to them. If they're not, please let me know. Okay?
A. I'll do that. Yes.
Q. First of all, I have some questions about who you are and what you do.
You list on your CV -- this is the Government's Exhibit -- I believe 2 -- that you are a criminalist with the firearm and toolmark forensic science division of the Contra Costa County Sheriff's Coroner's Office. Is that your position?
A. Yes.
Q. Are you employed by the Contra Costa County Sheriff's Coroner's Office?
A. On a contract basis, yes.
Q. Okay. So you're not a regular employee in the Contra Costa County Sheriff's Coroner's Office?
A. Well, I'm a regular contract employee.
Q. And that's -- do they have a crime lab in the county?
A. Yes, they do.
Q. Okay. And they have a crime lab director?
A. Yes.
Q. You used to be affiliated with that, right?
A. Yeah. I used to be the crime lab director there.

Q. And then, as I understand it, you retired and went to work for ATF?
A. Yes.
Q. And then after you went to work for ATF, you retired from that. And then you entered into a contract with Contra Costa County?
A. Yes. Do you want to know the reason?
Q. No, I don't.
A. Okay.
Q. Well, if you'd allow me, they can bring this out on direct examination, on redirect.
So you are not currently employed by -- other than in a contract capacity -- with the crime laboratory in Contra Costa County?
A. The Contra Costa County contracts with the -- with the limited liability corporation that I founded when I retired from ATF.
Q. Okay. And the contract is a $340,000 contract under which you're obligated to provide training services and assisting the crime lab, if I understand it correctly?
A. That's over a three-year period. I do provide a limited amount of training. But most of my -- most of my work is -- is on casework.
Q. So the contract calls you -- bills the county

$340,000 to do both training and -- and contract work, correct?
A. Yes.
Q. And that work is to assist the crime lab firearm examiners that they already have? In other words, you're not the sole person that does firearms work in that county, are you?
A. I am not.
Q. All right. So -- so you assist -- how many other firearms examiners do they have?
A. We have -- we have one who is actually a supervisor, so he does fairly little actual casework.
Q. Uh-huh.
A. We have two experienced people that do casework, one experienced person that is currently on loan to the FBI, and we have two examiners in training.
Q. And so your -- one of your roles under that contract is to assist those permanent employees in the county?
A. To a limited extent, yes.
Q. And then the other part of your contract is to provide training to the crime lab personnel who are permanently employed, right?
A. Just in firearms and toolmarks, yes.

Q. But you said you do no training, was what you said on direct examination.
A. No, I do a little bit of training, not very much. Most of my work is casework.
Q. Okay. And does the cont- -- is this -- for 340,000 is it a full-time position? In other words --
A. Yes.
Q. -- is your obligation to work for them full-time?
A. Yes.
Q. And does it allow for independent contracting with --
A. Yes.
Q. -- consulting work?
A. Yes.
Q. And I assume you get paid, for instance, in this case?
A. Yes.
Q. And what's the billing in this case that you --
A. My rate?
Q. Yes.
A. $175 an hour.
Q. And where does that -- does that money go back to the county or does that go to you?

A. It goes to me. It goes to my company. I work at Contra Costa by the hour. If I'm not there I don't get paid.
Q. Okay. Thank you for clarifying that.
Now, you purport to be an expert in the literature regarding the admissibility of firearms and toolmarks, correct?
A. Yes.
Q. And were you asked to review any of the specific casework in this particular case?
A. I did look over some of the casework.
Q. And what did you look over?
A. I looked over the case notes and report that Katharina Babcock wrote.
Q. Were you asked to reexamine the -- first of all, what's your understanding of what she did, just very briefly, in terms of did the work in this case involve shell casing matches or bullet matches? Or you talked about bolt cutters, hammers.
What did the work in this case involve, according to your understanding?
MS. MOTT: Your Honor, I'm going to object at this point. This is completely out of the scope of direct. This was not discussed whatsoever.
MR. BURT: Well, Your Honor, I think it is

relevant to his testimony. I'm trying to focus him on what was done in this case so I can ask him some questions that are relevant to this case.
THE COURT: All right.
Now in direct, the testimony was more on the -- on the science or the discipline --
MR. BURT: Right.
THE COURT: -- as opposed to specifics of this case.
How is this not outside the scope of the direct?
MR. BURT: Because he ranged far and wide about topics that I will educate the Court on have nothing to do with this case.
In other words, he talked about bolt cutters, he talked about many areas of -- of toolmarks that really are not relevant here. So I'm trying to focus him on what his understanding of what is at issue here so that I can then ask him about the literature that's relevant to this case and not literature having nothing to do with this case. And that's really the only purpose.
THE COURT: All right. Anything else?
MS. MOTT: My objection remains, Your Honor. You're absolutely right. He is here for

the purpose of discussing the scientific underpinnings and how it applies as Daubert factors and whether or not it is admissible under Daubert.
That's what he's here for, that's what he discussed.
Now, he did discuss a wide range of literature that is pertinent to the field and the science of firearm and toolmark identification.
I'm more than willing to allow and not object in terms of questions about that. But the actual facts of this case are not at issue with this witness.
THE COURT: Well, to the extent, Mr. Burt, that you would like to get into the science surrounding the issues that are involved here I will certainly give you that leeway.
But -- but beyond that, I would just caution you that this is not about cross-examination as to what was done in this particular case.
MR. BURT: Sure. All right.
BY MR. BURT:
Q. Just very briefly, then, what is your understanding of what is at issue in this case, in terms of what type of firearm or toolmark or cartridge case or -- or other toolmark examinations

are at issue?
A. I believe it involves the comparison of fired cartridge cases with some guns.
Q. Okay. So no bullet comparisons, correct?
A. I don't recall any, but I didn't do an in-depth evaluation of the casework.
Q. And we'll hear from Ms. Babcock, I'm sure, but no -- no other toolmarks outside of cartridge cases. In other words, there were no chisels or anything like that?
A. I don't believe so.
Q. Okay. And is it true that your field is -- and strike that.
The literature that you discuss addresses a number of different kinds of toolmark analysis, correct?
A. Yes.
Q. Some of the literature relates to comparing bullets, correct?
A. Yes.
Q. Other literature relates to cartridge case comparisons?
A. Yes.
Q. And then there's a large body of literature that addresses specific applications of toolmarks

outside of firearms, correct?
A. Yes.
Q. So there's articles about comparing chisels and knives and a whole host of physical options, correct?
A. Yes.
Q. Okay. And is it true that the -- most of the literature that you're familiar with deals with shell casing and firearm examinations, or are you familiar with a whole range of literature across the entire discipline?
A. I'm familiar with a range of literature.
Q. Now, in -- before you testified here today, did you assist the government in compiling this list that was submitted as an exhibit? In other words, all of these articles?
A. I suggested some of them, yes.
Q. And did you suggest this would be representative of literature, and so we should bring this to the Court's attention?
A. Yes.
Q. Do you think that the literature that is cited on the exhibit list here is a fair representation of the literature?
A. To a limited degree, yes. There's a lot more that we could add to that list, but yes.

Q. And did you intentionally try and confine the literature just to things written by practitioners in the field, or did you also include critiques or commentary by scientists outside your field?
A. There's some articles written by people outside the field.
Q. For instance, I think you mentioned Michael Saks as being someone with a keen intellect who you and your co-author attempted to respond to in that 1998 article you wrote about Daubert, correct?
A. No. We responded to his evaluation of the chapter in "Modern Scientific Evidence."
Oh, I'm sorry.
Yes. He -- we included a reference to Michael Saks in the 1998 article that Richard Grzybowski and I wrote.
Q. Okay. And he, I think you identified, as someone who is not a critic, but I think you referred to it as somebody who's keeping the field on their toes in terms of trying to constructively critique it.
A. Yes.
Q. Okay. And he's also your collaborator in this chapter in "Modern Scientific Evidence"?
A. He has been. I don't know whether he's going

to continue in that capacity in future editions or not.
Q. And that chapter you mentioned is -- you, I think, identified as something that was written to assist -- in part to assist judges in evaluating Daubert claims?
A. Yes.
Q. And the particular chapter that is marked here as an exhibit is, I believe -- is it 16 and 17? I think it is a portion of that same chapter, correct?
A. Well, I think 16 is the chapter, and the other one is a portion of it. That's that long footnote that I've mentioned.
Q. Okay. All right. And what -- do you try and stay current on the literature?
A. Yes.
Q. Is the literature that you helped put together here current?
A. Yes. Are you meaning chapter? Yes.
Q. It is?
A. You are referring to the chapter that...
Q. Yes. I'm referring specifically to chapter -- Exhibit 16, which is Chapter 35.
A. Yes.
Q. And what -- that book has gone through various

editions, correct?
A. Correct.
Q. It first got published in 1997?
A. Yes.
Q. And then there was a revision in 2002?
A. Yes.
Q. Another in 2010?
A. 2009/10, yes. In fact, I think there was one in between those two, also.
Q. Right. And then there's a current one, is there not?
A. I don't know.
Q. 2011/2012?
A. That, I don't know. Usually we're notified and asked if we want to submit revisions. I haven't gotten anything like that.
Q. Well, your name is on this chapter, correct?
A. Yes.
Q. What version of the chapter is Exhibit 16?
A. It's a 2009/2010 edition, Chapter 35. If there's a newer one, that's news to me.
Q. Okay. Are you saying if there's a --
I've marked as Defendant's A through H -- A through G the exhibits that were submitted to the Court on CD, per the Court's order. And so I have

additional exhibits, and the first one, then, I would ask -- that I would mark as Exhibit H.
MS. MOTT: And, Your Honor, for the Court's knowledge and objection, that we have not been provided this. We were provided a binder, but it's none of these exhibits past G.
THE COURT: All right. And what is this particular exhibit?
MR. BURT: Your Honor, this is the current version of a chapter than the older version that the government has submitted.
THE COURT: All right. Thank you.
MS. MOTT: Your Honor, just for the record, I was handed a CD, not the exhibit.
THE COURT: Do you have an exhibit for the government?
MR. BURT: Your Honor I have it on -- I provided it on CD, and I have a hard copy for the Court, I believe.
Your Honor, because these are voluminous exhibits, we prepared the second copies on CD. And so I have one working copy and one original for the witness at this point.
THE COURT: All right. Well, I think, if you have something you can show Ms. Mott, just so

that she can --
MR. BURT: Sure.
THE COURT: -- at least have some knowledge of what you're referring to.
MR. BURT: Yeah. And, Your Honor, just -- I actually didn't anticipate this problem, because I anticipated the government would have this copy. But the copy they're submitting is not the current version, so that's the difficulty.
But I will be glad to show it to Counsel.
BY MR. BURT:
Q. Is that the current version of the chapter?
A. It appears to be, yes.
Q. Okay. And you're listed as the author of the -- one of the authors in the chapter, correct?
A. Yes.
Q. Now, there appears to be some differences here between what got submitted in Exhibit 16 and --
A. There shouldn't be any differences in our portion of the chapter. There may be some in the first part, because that's written by the attorney editor.
Q. Right. And the first part, written by Michael Saks is, again, designed to address sort of the legal framework. And then you're addressing the science

part?
A. Yeah. Well, it used to be written by Michael Saks. It appears now that it may be -- well, I don't know who is writing it now, because I don't know who replaced Michael as the editor of our chapter. You can only think that ours -- our section is identical, since they didn't contact the authors.
Q. Okay. And so you don't keep up with the literature to the extent of knowing what gets currently published with your name on it, correct?
A. Oh, I do the best I can. I can only think that the reason they didn't get -- notify us is that it was so close to the 2009/2010 that perhaps they thought we wouldn't have any -- any suggestions for modifications.
Q. Now, do you get to review the entire chapter before it's published, both the legal aspect of it and the science part?
A. No, just our part.
Q. And you have read the -- once it's published, of course, you read the entire chapter?
A. I do.
Q. And is there a process where, if you have serious concerns about some of the legal aspects as it relates to the science, that you have some input

into that?
A. I've never made input. I didn't feel that it was appropriate. I figured that Michael would write what he wanted to write.
Q. All right. But some of it is actually related not so much to the law, but to the science, correct?
A. Some of it, yes.
Q. And that part of it, you would have some sort of input into it?
A. I've never chosen to provide input to that portion.
Q. So your knowledge of the literature -- this is something that is widely circulated, this particular chapter, correct?
A. I think it is.
Q. And you don't keep up with the chapter to the extent of actually reviewing what your co-authors wrote and seeing if it's accurate or not? You've never done that?
A. No, I have never edited Michael's. He never asked me to and I never took it upon myself to do it.
Q. But as an expert in the literature, whether he asked you to do it or not, you were -- you've never actually reviewed his section of it and -- with an eye towards determining whether his statements about

the science are correct; not the legal part of it, but the science?
A. It's not something that I considered relevant.
MS. MOTT: Your Honor, I believe that has been asked and answered.
THE COURT: It has been.
BY MR. BURT:
Q. Now, in the -- take a look at, if you would, at page -- do you have the government's exhibit in front of you?
A. Which one do you want me to look at? Chapter 35, the one from '09?
Q. Yes, page -- I think it is page 659.
MS. MOTT: And, Your Honor, just a suggestion for Mr. Burt. Maybe it would be helpful to put it on the Elmo what changes he is talking about.
MR. BURT: Sure, I can do that.
BY MR. BURT:
Q. You said you have read the legal part of this at some point?
A. It's been some time ago. I haven't read it lately.
I'm trying to find it. May I take time to find it?

Q. Yes, sure.
MS. MOTT: If I may, Your Honor, I think I might be able to --
THE COURT: Retrieve it for him?
MS. MOTT: Yes.
BY MR. BURT:
Q. Okay. We're at 659. I'll put that up on the Elmo. This is the government's exhibit.
One of the things that Professor Saks does in this literature is to provide critical analysis of the cases that have decided Daubert issues on firearm and toolmarks, correct?
A. As I recall, yes.
Q. And on this particular page of Exhibit 16, he's discussing the Diaz case out of the Northern District of California, correct?
A. Yes.
Q. And he makes a statement that I've got highlighted there: "The Diaz Court takes the studies and eventually reviews on their face engaging in no critical valuation of them."
Do you see that?
A. Am I supposed to be able to see something on this one? Okay. You have it on there?
Q. It should be.

A. And I'm sorry. I lost track of the...
Q. Okay. In the version that you identified as Exhibit 16 and the government identified, I've highlighted there the statement: "The Diaz Court takes the studies and eventually reviews on their face engaging in no critical evaluation of them."
A. I see that.
Q. Okay. And what he's referencing there is -- the studies being referred to are the scientific studies that you alluded to in your direct examination, correct?
A. I believe so. I'm not certain, because I -- I don't know what studies they're talking about, but I'll take your word for it.
Q. And basically the studies that you reference, sir, publish a lot of them in the AFTE Journal?
A. Yes.
Q. Which you consider to be a peer-reviewed journal?
A. I do.
Q. So that's the 2009/2010 version.
Now, I want to show you the current version of that same sentence. And now it reads --
A. What page are we on?
Q. This is 655 of the new version.

You see in this page that same sentence is there. It says: "The Diaz Court takes the studies and eventually reviews on their face engaging in no critical evaluation of them."

Do you see that?

A. Yes, I do.

Q. Then he adds another couple of sentences. And what he says is: "The Diaz Court also fails to recognize that the AFTE Journal hardly can be said to meet the basic requirements of a peer-reviewed journal. Peer reviewers are not blind, come entirely from the firearms and toolmark profession. And furthermore, the AFTE Journal itself is extraordinarily difficult for anyone but AFTE members to access, as it is not available on the Web, is not abstracted in any of the major scientific abstracting entities, and exists in holdings of remarkably few research libraries across the country."

Do you see that?

A. I do, indeed.

Q. Now, is that the first time you've ever seen that?

A. In this chapter. And you say that Michael wrote that. I'm not convinced that Michael wrote this.

Q. Well, I don't --

A. He's not the current editor.

Q. Okay. Who is? You are a co-editor of this chapter. Can you tell me who -- who wrote that?

A. They didn't tell me who the editor now is of our chapter.

You'd think out of common courtesy they would have, but they didn't do it.

Q. Well, in terms of your expertise of someone who knows the literature, this is one area where you can't tell me who the author of this particular pretty relevant piece of information is?

A. I know -- I know the literature as it pertains to the portion of the chapter that I wrote.

I don't know who wrote this, because one of the new names on this editor list is -- Jennifer Mnookin or Erin Murphy probably wrote this, because I understood that a woman was likely going to take Michael's place.

So I don't think Michael wrote this at all.

Q. And when you were opining that a woman probably wrote this --

A. Yes.

Q. -- what is that based on, the fact that your --

A. It's based on what somebody told me. That -- I think it was either David Faigman or David Faigman's wife, Lisa, who I give lectures for in San Francisco. She told me that the last time I was over there giving a lecture.

I said, "Well," I said, "I don't know whether Michael is going to continue."

And she said, "Well, I have an interest in being the editor, but I don't know if they would have me do that, since my husband, David Faigman, is also an editor." But she said, "I understand that" -- and she gave me a name. It was a woman's name, and it was probably one of these two names, but I don't know which one.

Q. Now, we're going to say this particular volume of this book has a high reputation for integrity in the forensic science field, correct?

A. I think it does, yes.

Q. And the authors and the co-authors are generally people that have a great deal of either academic background or practical background in the particular fields that they're writing about?

A. Most of them do.

Q. Would you expect that they would be dragging into this multivolume set people who are not qualified to edit this particular chapter?

A. I don't know what their qualifications are. I can't speak to that.

Q. Well, just generally, given --

A. I would hope not. I think that David Faigman -- David enjoys a good reputation. I know him personally.

Q. Uh-huh.

A. I would not think that he would have a hand in recruiting someone who was not qualified.

Q. You say David Figman has a good reputation, correct?

A. Yes.

Q. And he has testified against you in some of these more recent Daubert hearings, in opposition to the position that you have stated here today. Isn't that true?

A. He testified in one case in Contra Costa County. I didn't -- witnesses were excluded, so I wasn't allowed to hear his testimony. I have it, but I haven't read it yet.

Q. And do you -- so you have no idea what his views were expressed in that testimony?

A. Well, I have an idea. I was told by some of the members of my laboratory that he spoke about the NAS report, but then admitted that he hadn't read the

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entire NAS report.
And he was questioned about some of the other things, the one article that he and Michael Saks wrote that began -- the title began with "Failed Forensics," I believe. He was asked some questions about that.
Q. About the article "Failed Forensics"?
A. Yes. Yes.
Q. Is that an article that you read, "Failed Forensics"?
A. I have.
Q. You said that your article that was written in 1998 was meant to address the concerns or the criteria that Professor Saks had raised in terms of how you satisfied Daubert, correct?
A. Well, the article wasn't written because of that. But since I was familiar with what Michael had -- had written, I knew that he said that in order to make the conclusions that we come to in the firearm and toolmark identification, we have to be -- the three premises that he listed.
So I imported them into the article. I reported in our article how he had said that -- and I think it was in Shepard's Law Review or somewhere, and then I proceeded to describe how, in the opinion

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of Richard Grzybowski and myself, our profession meets those premises and satisfies those requirements.
Q. And based on your expertise in the literature, did you convince Professor Saks? Did he subsequently write an article which said, you know, I reviewed the Grzybowski article, and I now am convinced that firearms and toolmarks passes muster under Daubert?
A. I didn't ask him whether he agreed with what we wrote or not.
Q. I didn't ask you that. I said: Based on your expertise in the literature, do you know whether he wrote an article, after you wrote that article in 1998, in which he said, you know, now that I have reviewed the Murdock/Grzybowski article, I'm convinced that the firearms toolmark practice is on firm scientific grounds?
A. I never saw him write that.
Q. But you did see him write an article in 2008 called "Failed Forensics," correct?
A. Yes. But I also saw him edit the chapter. And he allowed it to see the light of day, where we go on record as saying that we do meet the scientific underpinnings.
I don't think -- I think that Michael has a

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good enough reputation to where if he would have felt that this is bogus he wouldn't have allowed the chapter to appear.
Q. And what did he say in this article called "Failed Forensics," since you've read it?
A. Well, it's an extensive article. I don't remember anything specific, other than that we -- one thing I do remember is that he said we didn't grow up within the university system.
Q. Okay. Did he also say that firearms and toolmarks -- that firearms and toolmarks sciences were non-sciences, as he calls it, it's "based on the irrational reliance on unspecified, unsystematic experience, coupled with plausible-sounding arguments as the nearly exclusive basis for their hypotheses."
Do you remember him writing that?
A. He did. He did write that.
Q. Okay. And do you remember him writing in that article: "The non-science forensics sciences, as the paradoxical phrase suggests, are those fields within the forensic science that have little or no basis in actual science. They neither borrow from established science nor systematically test their hypotheses.
"Their primary claims for validity rest on the anecdotal experience and proclamations of success

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over time. Hypothesis and supposition are typically considered sufficient; whereas in most scientific fields experience and observation are designed as the first steps of the scientific method, for many forensic fields they constitute the final stage of confirmation.
"Indeed, in a way, many practitioners of the forensic arts have turned the scientific method on its head. So long as their hypothesis and suppositions have not been tested, they are assumed true. Hypotheses that endure over time rather than actually being tested are deemed proven.
"This model was once pervasive in applied settings, especially in medicine, and produced such time-honored technologies as blood letting and phrenology. The fields that most" --
MS. MOTT: Your Honor, I have to object. I mean is there a question here or are we testifying?
And I am not even sure what exhibit we're referring to, other than I know the article. So...
THE COURT: Which exhibit is that?
MR. BURT: I haven't marked it, but I certainly will at this point. This will be -- this is Tab 2 of these...
THE COURT: Is that from the "Failed

Forensics" article?
MR. BURT: Yes. I'll mark this as Exhibit I, a copy for the Court.
THE COURT: So you were reading from the article?
MR. BURT: Yes. I'm on page 150. I was at the bottom of page -- top of page 150, where he says:
"This model was once pervasive in applied settings, especially in medicine, and produced such time-honored technologies as blood letting and phrenology.
"The fields that most resemble those ancient non-science sciences are the forensic identification sciences as well as certain other specialties within forensic science.
"By 'identification sciences' we mean those subfields that often are referred to as criminalistics and that involved pattern matching in an effort to associate a crime scene mark or object with a source.
"These subfields include the comparison of fingerprints, handwriting, bite marks, voice prints, toolmarks, firearms, tire prints, shoe prints, and so on."

BY MR. BURT:
Q. Would it be fair to say, based on that passage, that you did not convince Professor Saks, that you have described as having a keen intellect, of the rightness of your position?
A. What page were you on?
Q. 150.
A. The article starts on 149. So you are on the second page?
Q. Based on that passage, do you think that Professor Saks has been convinced of the rightness of your position?
A. No, I do not. But I disagree with his characterization.
Q. Right. And so what we're trying to get at here is what the relevant scientific literature shows.
And you pointed to some literature. This would be other literature that's certainly pertinent to the issue before the Court, wouldn't you agree?
A. It is certainly other literature. How pertinent it is I don't know. That's for the Court to decide.
Q. Well, you said in your direct testimony that your opinion is the relevant scientific community, for purposes of Daubert, is the AFTE organization.

Is that true?
A. Yes.
Q. Do you think that other scientists who don't belong to AFTE have a role to play in evaluating and critiquing your field?
A. Certainly any scientific field and the judiciary has a right to evaluate and critique our field.
AFTE is a relevant scientific community when it comes to the methods of evaluation and the justification for making conclusions. But evaluation is fair game for anyone.
Q. Fair game with anyone with the expertise or the knowledge to be able to -- to offer opinions?
A. Yes.
Q. You could offer opinions about astrology if you read the literature and were up on it and -- from the scientific viewpoint -- could say, "Even though I'm not an astrologist, I've read the scientific or non-scientific literature on astrology, and I could have an opinion this is an invalid science."
Do you see anything wrong with that approach, even though you're not as astrologist?
A. I don't think I would have enough time in my lifetime to become familiar enough with astrology to

offer any opinion that anybody would value, quite frankly.
Q. Sure. And I'm asking this as a hypothetical.
In other words, if you had the time and the inclination to review the relevant literature in a particular field, given your background and training, do you think you would be able to do that, even though you're not a practitioner of whatever the field is?
A. If I had the time and inclination. But I would also want to consult with practitioners and get a good handle on what's actually done in practice.
Because you can read the literature and not really get a very good handle on the specifics of what is being done or why people make the conclusions that they do.
Q. Now on that same page he says that: "The forensic identification science -- sciences have irrational reliance on unspecified, unsystematic experience coupled with plausible-sounding arguments as a nearly exclusive basis for their hypotheses."
Do you agree with that statement?
A. I just found where you're reading from, so let me look at it briefly.
Q. Sure.

A. If the field relied on unspecified unsystematic experience I would agree with it.
Q. Right. And he's including your field within this commentary. Do you understand that?
A. I do. And I think he's wrong.
Q. Okay. That's a legitimate area of disagreement, correct --
A. Yes.
Q. -- between the two of you?
A. Yes.
Q. You do hold respect for his opinions?
A. Yes.
Q. Okay. Now he also says, at the bottom of that same page: "The non-science forensic sciences" -- again including your field -- "have failed on several levels. They're scientific failures in the sense that science either in substance or in methodology played little more than a rhetorical part in the development of these fields. The word and the accouterments of science were exploited to sell these fields to the Court and to the public."
Do you agree with that sense?
A. I see what it says, but I don't agree with it.
Q. Okay. And you were aware of these opinions when you gave your opinions on direct testimony?

A. Yes.
Q. When you were presenting the Court with an overview of the literature, is there a particular reason why you did not cite contrary literature, like this, to indicate to the Court there's really a controversy here? It's not just AFTE, it's other people weighing in on the other side.
Is there some particular reason you didn't do that?
A. Yes.
Q. Why?
A. I advocate the propriety of firearm and toolmark identification. And so I was asked to come to court and present what I think is a cogent argument in support of that position.
If I was asked to come to court and compare and contrast conflicting views with views that do advocate that position, I would certainly have included those.
Q. So your role, as you see it, was as an advocate to present an argument in support of the person who called you, correct?
A. Not the person that called me. I'm here to speak on behalf of the forensic examination of firearm and toolmarks and the forensic identification

of those. I'm --
Q. Go ahead. I'm sorry.
A. I'm convinced of the propriety of those conclusions as they are done in the best laboratories as the end result of quality casework, casework that is punctuated by skillfully crafted notes, the use of photomicrographs, all the things that Chairman Rolph said were the hallmarks of good science and should be evaluated on a case-by-case basis.
Q. Is Chairman Rolph a forensic scientist?
A. No, he's a statistician.
Q. Right. He has never been in a crime lab in his life, has he?
A. I have no idea.
Q. But he's not a forensic scientist?
A. No. He's a statistician.
Q. Right. So you value his opinion, even though it's not of a forensic scientist in this particular field -- in your particular field?
A. Yes.
Q. That opinion you value, correct?
A. I happen to agree with his characterization of what constitutes quality casework. And anyone could offer that, and I would agree to it.
Q. And how much writing has John Rolph done in the

field of forensic science as compared to, say, Michael Saks, who, as you say, has been tracking these issues for years?
A. Oh, I don't think John Rolph has written near as much as Michael Saks.
Q. Can you name me one publication that he's written in the area that we're talking about here, firearms and toolmarks?
A. No.
Q. Has he ever written any article about your field?
A. I doubt it.
Q. Other than chaired this committee?
A. I doubt it.
Q. Which had some negative things to say, correct?
A. They did.
Q. As evidenced by the fact that you felt compelled to respond to the negative things.
A. Yes.
Q. Even though that was not their charge to evaluate the field, you admit that there is negative commentary in that 2008 report about the scientific validity of your field?
A. Yes.
Q. If there wasn't any negative commentary, you

wouldn't have written that response?
A. Probably not.
Q. Okay. And this particular article we are talking about, the forensic failure -- "Failed Forensics" article, that does comment on your particular field, right? It's not a generalized statement about forensic science in general. It particularly evaluates firearms and toolmarks?
A. No, it's a general -- it's a general commentary on the comparative of forensic sciences.
Q. He says in the article -- you mention training programs. One of your slides had all of those programs listed for firearms and toolmarks?
A. Yes.
Q. He says in this article "only a relative handful of schools nationally have forensic science departments, and most of those are devoted to teaching the technologies of the past" --
MS. MOTT: Your Honor, page number, please?
MR. BURT: 152.
BY MR. BURT:
Q. -- "most of those are devoted to teaching the technologies of the past rather than testing the limits of these technologies or developing their scientific foundations."

Do you agree with that statement?
A. To a limited degree, I do.
Q. Okay. He says, on page 153: "If forensic individualization science had emerged from normal science" --
A. What about -- oh, I see where you are. I'm sorry.
Q. The second paragraph. Second column, second paragraph.
A. Thank you.
Q. "If forensic individualization science had emerged from normal science, its approach and its techniques probably would resemble DNA typing, with its measurement of attributes, sampling the variation of populations, and statistical basis. Error rates, probability levels, confidence intervals and so on would be natural parts of what developed.
"The elements of subjectivity and forensic examination would themselves be topics of research, to understand both their operation and how to tame them."
Do you agree with that statement?
A. Only in part, because I've already testified that DNA makes their associations on the basis of subclass characteristics. And so the things that

he's outlined here are absolutely essential for that field.
And I do not think that many of them are applicable to our field, since we deal with individual characteristics. We don't identify on the basis of subclass characteristics, but they do.
Q. So are error rates applicable to your field? I think you testified about error rates --
A. Yes, they are.
Q. -- right?
A. They are.
Q. And as I understand your testimony on error rates, you said there's problems with using CTS proficiency exams to estimate error rates, but then you went ahead and gave us an error rate estimate, correct?
A. Yes.
Q. And so how do you do that scientifically? If there are problems with using CTS as a base for error rates, how do you compute a scientifically defensible error rate?
A. Because it's the best that we have. It provides a general indication, but only a general indication.
Q. You address error rates in your -- in your

chapter -- Chapter 55, correct?
We're back to Exhibit 16.
A. Yes, I'm there.
Q. You are discussing the issue of error rates here, correct?
A. In part, yes.
Q. Yeah. And would you read the paragraph which begins: "Based on present data, the field is in a poor position to calculate error rates."
Read the rest of that paragraph and the beginning of the next.
A. "Thornton recently addressed known or potential error -- rate of error by saying the test results hinging on judgment calls do not lend themselves to analysis by conventional statistics.
"No doubt Thornton was not saying that the products of human judgment cannot be measured statistically, since most if not all of cognitive science does precisely that. But rather that forensic science researchers have not managed to calculate them for the forensic specialties like firearm and toolmark comparison, that depends in part on subjective judgment.
"With modern statistical technology, forensic science decision-making could be subjected

to quantitative analysis, but to date it has not been.

"Some have used the results of the proficiency testing program administered by the forensic sciences foundation as a major information about error rates. Admittedly, this is tempting, since they represent virtually the only information collected on a large scale. But it is, at the same time, a flawed approach.

"These declared, not blind, proficiency tests were designed to be used by individual crime labs as a quality assurance tool and were never intended to be used as a basis for a nationwide study of forensic error rates.

"Some crime labs treat them formally, requiring that they be completed by the due date so that their results will be among the tabulated data sent out following each test.

"Other laboratories treat them much less formally, asking only that they be worked on as time permits, and it usually does not, since other labs work harder on the proficiency tests than on their regular caseload, because they are a test.

"In addition, some examiners may be more conservative when reporting the results of a declared

proficiency test, feeling that they have little to gain but much to lose if they make an error.

"It has generally been the case that although proficiency test results have been reviewed by a supervisor before being reported, they were not subjected to peer review.

"Peer review is an important process widely used in crime laboratories. This process helps prevent errors in casework from seeing the light of day.

"In cases where the supervisor was not a subject matter expert in the proficiency test subject, there would be essentially no peer review. In these circumstances the reported error rate would, therefore, closely approximate an individual examiner's error rate.

"The American Society of Crime Lab Directors lab accreditation board approved a program in December '97 to subtly move the proficiency test results into a high-stakes game."

Q. If I could interrupt.

Do we have enough context there, or do you feel the need to read on?

A. Context for what?

Q. Context for your statement that it's a flawed

approach to use these proficiency tests to estimate error rates.

A. No, I think that does a good job of covering it.

Q. Okay.

One of the things you don't say there is that one reason why you can't use proficiency tests to estimate error rate is because these tests are too easy.

A. Well, I said that you can use them, but I also already underscored the fact that they are a lot of times much easier than normal casework.

Q. You've testified in other Daubert hearings that in your experience taking these tests, these things are way too easy to use as error rates for actual casework.

A. Yes, they are easy.

Q. Very easy?

A. Some of them are very easy.

Q. And I'm talking about your own experience in taking them.

A. Some are more challenging than others. But as a group, as a rule, they are easy, straightforward.

Q. So they are not a good measure of error rate in terms of, you know, what is an overall error rate for

the field, for the reasons you stated.

It would be a flawed approach to adopt your view that error rates can be estimated based on proficiency tests?

A. Well, they can be estimated. But as I've said here, I don't think it's the best approach.

Q. No, you didn't --

A. I think --

Q. -- say you didn't think it was the best approach, you said it was a flawed approach.

A. Yes, for the reasons -- for the reasons that I testified to earlier, and that you had me read here now.

Q. Okay. You mentioned proficiency tests that are harder that are given in Europe.

A. Yes.

Q. Right?

What -- what is the error rate calculated from the more realistic tests given in Europe, if you know?

A. I don't know exactly. But as I recall, it could have been up around 5 percent. And I think they also had an issue in Europe with confusing subclass characteristics for individual characteristics, because there were some laboratories

in -- represented in the European group -- and there are many countries represented in that group.

There were some countries that just had not kept up with the literature on subclass evaluation. I mean, I have fairly good knowledge of this, because the guy that I team teach with, Bruce Moran, took the last series of -- of these replica proficiency tests. And he got -- he got them all correct, and he was invited to go to the Hague for their meeting a year or two ago and present his findings.

And so I -- I have firsthand knowledge of what went on there.

Q. So in these harder -- these more realistic proficiency tests, you cited 5 percent. What's the source of that number? Do you know which test that was or --

A. It was the most recent. I think it was the -- I think they did a round -- a round of these tests in 2009, and the earlier in 2005. And I think it was related to the 2009 amount.

Q. Okay. And that -- we're talking about false positive error rates, correct?

A. Yes, correct.

Q. I remember back in the days when we used to do serology admissibility hearings. George Sansibar

(phonetic). You know who he is, right?

A. I do, indeed.

Q. He used to testify that a 2 percent error rate is an unacceptably high rate.

Do you have a similar cutoff for unacceptably high error rates in your field?

A. No. I mean any -- any error rate is unacceptable. But these cases, I mean, this is a human enterprise where you have human beings doing the work and there's always going to be errors.

And as stated in the last part of this chapter, my professor at US Berkeley, Dr. Kirk, his mantra was "Errors in forensic science are not allowed."

Q. Are not acceptable?

A. Are not allowed. Yes.

But I go on to say that errors are going to be committed, and that all we can do is try as hard as we can to minimize the occurrence of errors.

Q. And one of the things you didn't talk about in your testimony is Government's Exhibit 24, which is a designated Detroit Police Department firearm unit preliminary audit findings.

You're familiar with that, right?

A. I am.

Q. And they had a problem in the firearms section in the Detroit Police Department?

A. They certainly did.

Q. And they went in and did a systematic audit, did they not?

A. Yes.

Q. Determined an error rate for a group of people who were working in that particular lab?

A. Yes, they did.

Q. What was the error rate they found, based on the actual casework, not on proficiency testing?

A. I think it was around 10 percent.

Q. 10 percent. Okay.

Now aside from that study, do you know any other studies out there that are based on actual audits of labs that have that evaluated to see what their error rate is?

A. No.

Q. You admit that the final determination of a match or a non-match is a subjective process?

A. It is mostly subjective, except when it comes to striation marks that are evaluated by people that use quantitative consecutive matching striae.

And that lends an area of objectivity to that comparison. We use that, for example in our

laboratory. I use that for every striated comparison that I do.

Q. Okay. And your understanding was that that method was not used in this case, correct?

A. I don't believe it was, that's correct.

Q. Was not.

Would it be fair to say that within your field there are two schools of thought in terms of methodology, one group being people who subscribe to what you just referred to -- I think in your field that's called CMS, correct?

A. I'd like to see it referred to as QCMS. Because everybody uses CMS, whether they use pattern matching or whether they consciously tabulate the amount.

Q. Okay. So QCMS refers to qualitative?

A. Quantitative.

Q. Quantitative.

A. Yes, consecutive matching striae.

Q. Okay.

A. Where you make a deliberate conscious count of the runs of matching striae that you see.

Q. And that is a methodology that you have been advocating for some time, correct?

A. Yes.

Q. Since at least around the time you were in graduate school?
A. Well, I started studying it then.
Q. And one of the reasons you started studying it was because you surveyed the field when you were in graduate school and you found that the field was pretty lacking in scientific rigor, correct?
A. In that particular area, yes.
Q. Yeah. You -- you wrote your thesis on toolmark and firearm individualization as affected by manufacturing methods?
A. I did.
Q. Okay. And you studied that thesis, which you wrote in '77?
A. I think so, yes. A long time ago.
Q. Right. At that time you had reviewed all the literature?
A. I reviewed a lot of it, yes.
Q. And you said: "However, this striation analysis commented to toolmark and fired bullet comparisons represent areas of forensic interest which are considered by most to be more of an art than a science.
"The opinions or value judgments given about these comparisons are based upon subjective

estimates of probability and not upon statistically sound scientific principles.
"This is true, even though the so-called scientific method may be used in the examination conducted."
That's what you wrote in '77?
A. I did.
Q. All right. And that was based on a fairly clear review of the literature up to that point in time?
A. Yes.
Q. And it was based on that view that you and one of your colleagues at the university began to explore the possibility of using a more objective approach to do these assessments?
A. Yes.
Q. And that's eventually evolved into this QCMS methodology?
A. Yes.
Q. And you wrote about that later with your colleague Professor Biassoti, right?
A. Al Biassoti, yes.
Q. Al Biassoti.
In 1984 you wrote an article again reviewing the state of the literature at that point,

correct?
A. We did.
Q. That's not included in the government's exhibits, is it?
A. No.
Q. Is there a reason for that?
A. No.
Q. What was the title of that article? It's listed in your CV. I think it's October of 1984.
A. What page is it on?
Q. I'll give you a copy. Is this a copy of the article that you wrote in 1984?
A. This is a portion of the article. It's missing some things, but it is a good part of it.
Q. Well, it's the text portion. But I think you had some photographs attached to it?
A. Yes. We had a proposal for the FBI research and training unit, as well as some photographs.
But this does have the text and it has the list of references.
Q. Okay. And the pages on this from your journal, unfortunately, are not numbered. So if you can take a look at page 4. There's a section that's entitled "Quantitative Analysis of Identification."
Do you see that?

A. Yes, entitled "Quantitative Elements of Identification." I see it. I see it on the screen.
Q. And you are, here, commenting on, again, your review of the literature up to this point, correct?
A. Yes.
Q. And read from -- I guess beginning with the sentence "Traditionally."
A. "Traditionally, most toolmark researchers have attempted to satisfy both the qualitative and quantitative requirements of toolmark identifications by comparing toolmarks made by consecutively manufactured tools."
And then it says "refer to references on gun barrels 9 through 15, and non-firearm tools 15 through 24."
Q. Uh-huh.
A. "Such studies are subjective evaluations based on criteria of identification which cannot readily be articulated or communicated to other examiners through photography."
Q. Okay.
A. "Except through photography." I'm sorry.
"The information gained from such studies is, therefore, only of value to the examiner who conducted the study or to the examiners trained or

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supervised by that examiner.
"Although such subjective evaluations can be valid, especially when such work is well-documented photographically, a search for more objective approaches to individualization should continue for the reasons:
"Number 1, the basis for forming a pattern recognition conclusion cannot be explained to anyone else.
"2, one person's work cannot be evaluated by another person without repeating it.
"And, 3, a quantitative or mathematical probability estimate cannot be given."
That was true then and it's true now.
Q. Okay. And so you're critiquing here those very same type of consecutive barrel matching studies that you have on your PowerPoint, right?
A. Yes. I commented -- well, I wasn't critiquing them. I was just making reference to the fact that -- and I described this during my direct testimony, how that those empirical studies helped form the basis for the AFTE theory of ID, but they do not assist an individual examiner in honing their personal criteria for identification.
Q. Right.

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A. Because we can't -- we don't -- we don't have a quantitative measure of what they did, or we don't have -- in most of these cases, we didn't have photographic exhibits.
And then I mentioned the Dowling experiment, where he fired about 5,000 bullets and was able to identify, I think, all of those. And he said that he used quantitative consecutive matching striae for that comparison.
Well, immediately, I know what his identification criteria was. That has much more meaning to me than somebody who just reports on, "I used pattern matching to identify these, and they were all fired from the same gun."
I don't know what that person's individual criteria is. That's what this means.
Q. Well -- and you also say: "The information gained from such studies is, therefore, only of value to the examiner who conducted the study or to the examiners trained or supervised by that examiner."
Is that still your view?
A. From the basis of positive -- of a personal identification criteria.
These studies certainly have basis for forming -- helping form the basis for the AFTE theory

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of ID. But as far as helping form the basis of a personal criteria for identification, they fall short of that because it's not a quantitative estimate that you can communicate to somebody else very handily.
Q. And that's still a limitation of those studies, correct?
A. Yes.
Q. Of all of those studies you cited in your PowerPoint, that same criticism applies to those studies, does it not?
A. It is a limitation, as far as providing a resource for honing your personal criteria for identification.
They do -- they are helpful in forming the backdrop of -- of empirical studies that helps support the AFTE theory of ID.
THE COURT: We'll take our afternoon break at this time.
We'll be in recess for 15 minutes.
(A recess was taken from 2:57 p.m. to 3:20 p.m.)
THE COURT: Please be seated.
We're back on the record.
Mr. Burt, you may continue.
MR. BURT: Thank you, Your Honor.

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BY MR. BURT:
Q. I just want to return one minute to the issue of error rates. And we talked about this 10 percent error rate that was based on that audit.
In addition to those kind of systematic studies, you have firsthand experience of errors committed in your field, correct?
A. Somewhat, yes.
Q. You were involved in a case some years ago, the Ricky Ross case, I think you've testified about in a number of proceedings.
A. I was. I was involved in that.
Q. And that was a homicide case where an examiner -- a firearms examiner made a false positive match that, fortunately, was discovered by you and others, correct?
A. Yes.
Q. And you have had other experiences like that besides the Ross case, where there's -- you've come in and seen false positive matches by other examiners?
A. Yes. And there's some from years ago that was really the cause of the -- AFTE forming the criteria for an identification committee. It was not only my experience that there were differences of opinion

that seemed to go beyond just normal differences of opinion, but sometimes work that was substandard. And that is why they formed the criteria for the ID committee.

Q. They started talking about doing that in about 1985, right?

A. Right about then, yes.

Q. Was that when the Ross case was happening?

A. I think that happened a little later.

Q. To get that going, you -- you wrote some sort of memo to the AFTE board suggesting that there were problems in the field that needed to be addressed, correct?

A. I did.

Q. You said in that memo: "The standard AFTE glossary primary concern of firearm identification is to determine if a bullet, cartridge case, or other ammunition component was fired by a particular firearm."

And you said: "This is accomplished now by applying subjective," and you underline subjective, "criteria to the comparison of questioned/known striae. This criteria is difficult if not impossible to convey to Courts and to other examiners."

A. Yes.

Q. That was a concern, then, that prompted this criteria definition?

A. Yes.

Q. And it's still a concern today, correct?

A. Yes.

Q. In a sense that that was one of the main critiques of the NAS 2009 report, was that the AFTE theory of identification was too subjective, in their view?

A. That was one of the criticisms, yes.

Q. Okay. So that's a concern that you yourself had back in 1985?

A. Yes.

Q. You don't disagree with the 2009 report on that particular issue, that the criteria for identification is -- is subjective?

A. It is subjective. And it states in there, right at the end, that it is based on the subjective evaluation by examiners based upon their training and experience.

Q. You wrote in that -- in that same memo: "We are putting the Courts in an increasingly difficult position. We ask that they believe us when we testify about individualizations. They ask us to tell them why they -- they ask us to tell them why they should. We respond with the usual subjective and art-formed answers. They reject them. Is there a way that we can provide answers more acceptable to both our members and the Courts?"

That's a concern you expressed in '85?

A. It is, indeed.

Q. The same concern the NAS expressed in 2009?

A. Yes.

Q. Okay. So you agree about that particular aspect of the 2009 report, correct?

A. Yes.

Q. And if in fact, as you state here, the criteria for identification is subjective, how do you determine what the ultimate truth is in a -- when you're determining error rate?

In other words, one examiner says it's a match. Like in the Ross case the guy said it's a match, you and others came in and said it's not a match.

How do we know, in truth, if there is such a thing, who's right and who's wrong when you're using this subjective criteria?

If it's an art form, and -- what makes your art better than his, I guess is my question.

A. Well, one of the best safeguards that we have these days, and it's much more widespread than it was then, is skillful technical peer review.

And that, as I have written and probably said here, is one of the main things that helps prevent errors, when they occur, from getting out the door, is that other people with equal or more experience, even, look at identifications and make an independent evaluation.

It's not just a rubber stamp, look-through-the-microscope confirmation. A good verification process is really just an evaluation process.

"Would you come over here and evaluate what I have under the microscope?"

In the best kinds of evaluation, the technical peer review in the laboratory, other skilled examiners will be called over to look at things that are not just identifications. They will be called over to look at things that the first examiner, me, for example, doesn't think is an identification.

Q. Right. But how do you determine where ground truth is? In other words, in the Ross case, there was peer review in the sense that you reviewed this guy's work, Chuck Norton reviewed the guy's work, and you two determined he was wrong. He, on the other

hand, said, "No, I believe this is a match," right?
A. Well, Al Biassoti also reviewed the work.
Q. So it was three to one. Do you count and say, well, it's the majority rule; and, therefore, we're right and he is wrong?
How do we know he wasn't right?
A. Well, the first error was discovered at the intercomparison of cartridge cases. And the fact that he made an error was incontrovertible. In other words, when I sat down and looked at the -- and I'll remember it until the day I'm not here anymore. I looked through the microscope and I -- I looked and saw what was on the left and right side of the comparison microscope.
And it looked to me like they had one of the cartridge cases 180 degrees out of face. It should have been the other way around.
So I placed a little ink mark on the side of the rim of each of the cartridge cases. And the person that had done the -- looked through the microscope and verified the first examiner's results, I said, "Please look through the microscope and see that I have put these black ink dots in corresponding positions on both of these cartridge cases. Just look through and verify that I did that."

He looked through and he said, "Yes, I see that you have done that."
We then took -- lifted them off of the comparison microscope, took them over and put them under the stereo binocular microscope, and I said, "Okay. Now, let's evaluate by the other markings," much like the schematic that I showed during the PowerPoint that showed all the toolmarks at various positions. You can tell in the guns that they had, the extractor was at 3:00. You could see a defined extractor mark at 3:00.
Q. To you, you could see that?
A. And he could, too.
Q. And my question is: How does peer review -- you said, well, peer review is a guard against error. If they are both using a subjective process, which you and the committee in 2009 said was subjective, how do we know who's got it right?
A. May I continue --
Q. If there's no --
A. -- with my explanation of the Ross thing? It will only take another 15 seconds. You asked the question.
Q. Go ahead.
A. So when -- so under the stereo microscope,

here's the black ink dots. One of them was at 3:00 and one of them was at 9:00. So the examiner knew in an instant that they had misplaced these cartridge cases on the comparison microscope, and they couldn't possibly match in that orientation.
Q. Right. But in other cases --
A. So there was no question that there was an error in that particular case.
Q. Right. But in other cases, you have situations where two examiners, equally qualified, come in. And based on the -- and I am not talking about the point counting qualitative analysis, I'm talking about the traditional pattern matching subjective approach.
A. Yes.
Q. You've seen situations in your practice where one examiner has said it is a match, the other has said it's not, correct?
A. That's actually unusual when -- when it's a true match. It's very unusual to have one -- to have equally skilled examiners, one say there's not enough there, and the other one says there is enough there.
That doesn't happen very often.
Q. How do you know it's unusual?
A. Well, one of the ways you could tell is by that -- the examination that Hamby did, by mailing

those validation studies around to over 600 people from 23 countries, I think, now.
Nobody in that intercomparison of 15 unknowns fired from 10 different consecutively rifled gun barrels has made an incorrect -- they have not -- there's been no one that's made a false ID.
Q. These are not --
A. Out of all of those comparisons, you would think that somewhere along the line with that many people looking at that many specimens that somebody would make a mis-ID.
Q. And those specimens are subject to the same critique that you made in your article back in '84, right?
A. Yes. This is -- most of those people are doing it strictly by -- by pattern matching.
Q. Pattern matching. And they're not case-related materials. These are pristine bullets?
A. They are.
Q. They aren't shot-through bullets. They're nothing like the kinds of cartridge that is relevant in this case, correct?
A. Correct.
Q. Okay. So do you know of any studies that have been done on case-based work, not pristine shells or

bullets, that you can point to as validating your field?
A. The only thing that comes close to that is the European proficiency tests.
Q. That's what we talked about before?
A. Yes, where they circulated borderline cases. They choose them particularly because they were not easy. And that generated about -- I think about a 5 percent error rate, I think. I'm not certain, but I think that that was about right.
Which the converse side of that is that there's 95 percent of the responses that were handed in that were correct, even in borderline cases.
So that suggests to me that the vast majority of determinations based on pattern matching of the striated -- I think they were almost all -- I think there might have been some compression marks, but most of them were striated -- they got the right answer. They got the answer that 95 percent of the people agreed with.
Q. With a 5 percent error rate. With 5 percent of the people getting it wrong?
A. Yes.
Q. False positive?
A. Yes.

Q. Okay. Now, one of your points on direct examination was that there was a lot of literature out there, that somehow the committee that -- the 2009 NAS committee missed in their analysis, correct?
A. Yes.
Q. Okay. And you base that on what? Were you present at the committee meetings? Did you -- do you know -- well, first of all, you were not a member of the committee?
A. Correct.
Q. Were you present at any of their internal deliberations?
A. No.
Q. Were you informed in any documentation as to what material they considered in any of the fields that they looked at?
A. Yes.
Q. And that is in relation to an oral communication you received?
A. No. The references that are in the publication that you have, the hardbound -- the NAS report. They list four or five references in my field that they looked at.
One was Ron Nichols, one was one that your expert, Adina Schwartz has -- rather, wrote -- and

then there were three others. I don't remember exactly what they were.
Q. So your assumption is that because they cited certain studies, they didn't consider the others? That's the basis for your opinion that they didn't look at all the --
A. Yes. I've never gotten any indication that they considered anything other than that.
Q. Well, they say in their report --
A. And I know that the person that made the presentation that we described only briefly, the 30-minute oral presentation, presented no reference material, because he told me that.
Q. Okay. Let me -- let me get this straight. The NAS was tasked specifically by the forensic science community into looking into the validity of particular fields, right?
A. It was the forensic science community that requested a study like this.
Q. And that study came after the 2008 report had already critiqued, said some very -- in your phrasing on direct examination -- "demeaning things" about your profession.
A. Yeah.
Q. Right?

A. The 2009 report, although their inquiry started about three years earlier --
Q. Uh-huh.
A. -- they started prior to the 2008 NRC report. Their report, the NAS report, came out in '09, a year or so after the '08 NRC report.
Q. So that report, the 2008 report, was out while the proceedings for NAS 2009 were going on, correct?
A. Yes.
Q. And you reviewed -- before 2009 came out, you were aware of the 2008 report, you and people on your committee.
A. Yes.
Q. Right?
A. Yes.
Q. And you read in there that they actually reviewed the literature, didn't they? Don't they cite chapter and verse all these same studies you've got in your PowerPoint?
A. Not to my knowledge.
Q. Do you have it there in front of you?
A. I don't, no.
Q. We'll take a look at -- I think you have Exhibit 10. Do you have it there in front of you?
A. I don't have Exhibit 10, no.

Wait a minute. I do have it here. Well, I do have the report.

Q. Do you have it in hard copy?

A. I have my own copy.

Q. Okay. Great. We're talking about 2008.

A. Oh. I have that, too.

Q. Good. This is Government's Exhibit Number 10, I believe. Turn to page 70 of the report.

A. (Witness complies.)

Q. Do you have it?

A. Yes.

Q. It says: "In recent years, several review articles have summarized the findings of individual studies on the basic principles of firearms and toolmarks. The uniqueness, reproducibility, and permanence of individual characteristics, as seen by trained examiners. Most of these studies are limited in scale and have been conducted by firearm examiners and examiners in training in state and local law enforcement laboratories, as adjunct to their regular casework.

"The review articles attempt to piece together major themes from decades of such studies. Most have been published in the AFTE Journal, but also in other forensic science publications.

"Nichols contributed a two-part narrative with a goal of characterizing the state of the field. Bohn, Fontoni and DeKinder (phonetic) review a broad array of experimental studies on the influence of manufacturing techniques.

"We draw from these review papers in this section, and excerpt additional detail from the individual studies as appropriate."

Do you see that?

A. I do.

Q. And then they go on for pages reviewing the very studies that you cited in your PowerPoint, right?

A. They review some of them, yeah.

Q. Well, from page 70 all the way through 81, correct?

A. Yes. They reviewed them from the standpoint, for the most part, of longevity, which they should have done, because they were interested in ballistic imaging.

Q. And then at page 81 they say: "Our review in this chapter is not, and is not meant to be, a full weighing of evidence for or against the assumptions, but it is ample enough to suggest that they're not fully settled mechanically or empirically."

Another point follows directly:

"Additional general research on the uniqueness and reproducibility of firearms-related toolmarks would have to be done if the basic premise of firearms identification are to be put on a more solid scientific footing."

Do you see that.

A. Well, you started reading right after 3E, "Commentary"? You didn't tell me where you started, so I --

Q. The bottom of page 81.

A. -- was flailing around here trying to find it.

THE COURT: Now, are you reading from something that's an exhibit?

MR. BURT: Yes, Your Honor. I am sorry, Exhibit Number -- it's Government's Exhibit 10.

MS. MOTT: Actually, Your Honor, Government's Exhibit 10 does not include the full text of the 2008 report, as Mr. Burt had pointed out earlier. So I am not sure if they're offering that as an exhibit or not.

MR. BURT: Well, I am. And it is reproduced in full as Defendant's Exhibit F.

And I believe the Court has that volume.

81 -- if I could approach, Your Honor?

THE COURT: Yes.

BY MR. BURT:

Q. 81 is a copy of the report, right?

A. Right. Here's the page.

Q. At the bottom of page 81, we're at the last, "Our review."

A. Okay.

Q. And the point I was trying to make is, they carefully review all of these studies that you cite, including the Nichols articles, the review articles which referenced one of the other articles.

And even though they review those in detail, they end up saying it is not: "It is ample enough to suggest they are not fully settled mechanically or empirically, and additional general research on the uniqueness and reproducibility of firearms-related toolmarks would have to be done if the basic premise of firearm identification were to be put on a more solid scientific footing."

A. I think the key word here is "on a more solid scientific footing," and I would agree with that.

And that's why we are working every day, and that's why we want research moneys directed into institutions. We talked about the 3D analysis.

So I think it is important.

What they are not saying is that it is not solid enough to prevent people like me to come into court and to testify about the intercomparison of -- the forensic comparison of firearm and toolmark evidence.

Could it be put on a more solid footing? We're trying to do that. We're trying to develop random match probabilities. I think all of that is good, and I endorse all of those efforts.

Q. All right. Let me return to the point I was trying make, which you were slipping off of. Which is you had represented that they didn't review literature.

Do you remember that?

Did they review it or not?

A. I said that the NAS report didn't review the literature.

Q. So did the 2008 NAS --

A. They reviewed -- they reviewed a lot more of the literature than the NAS committee did.

They reviewed it, however, from the standpoint of ballistic imaging. Most of their work is done on longevity studies.

Q. But they are citing it here for the proposition that your field needs to be on more solid scientific

footing, correct?

A. I agree that it could be on a more solid scientific footing.

Q. They're citing the literature that they review in detail for that proposition, right?

A. And I would agree that it should be on more solid scientific footing.

Q. And the 2009 report references back to the 2008 report where the literature is reviewed in detail?

A. It's not clear to me that they did that at all.

Q. It's not clear to you that what?

A. That they used any analysis of -- of data.

Q. Now, you said --

A. I would have thought that the NAS committee would have taken it upon themselves to review that literature. They say on page 7 that they didn't have it within themselves. It wasn't something that they had to do, and they didn't do it.

Q. Where do they say on page 7 that they didn't have -- you said on direct that they said on page 7 that they didn't have the time to do it.

And you just said that they didn't have it within themselves to do it.

Where does it say that on page 7, those specific points?

A. It's the first indented paragraph on page 7. Would you like me to read it?

Q. Yes. Well, I would like you to read the part where it says they didn't have it within themselves to do it and they didn't have the time to do it.

A. Would you like to bring up your copy as I read this?

Q. No, I've got my copy. Thank you.

A. At page 7?

Q. Yes.

A. Okay. "The committee decided early in its work that it would not be feasible to develop a detailed evaluation of each discipline in terms of its scientific underpinning, level of development, and ability to provide evidence to address the major types of questions raised in criminal prosecutions and -- and in civil litigation.

"However, the committee solicited testimony on a broad range of forensic science disciplines and sought to identify issues relevant across definable classes of disciplines.

"As a result of listening to this testimony and reviewing related written material, the committee found substantial evidence indicating that the level of scientific development and evaluation varied

substantially among the forensic science disciplines."

If I was the NAS committee listening to the presentation that was made on firearms and toolmarks, I would have reached the same conclusion.

Q. Well, except you forgot that in your 2009 critique you stated that you provided them with hundreds of articles.

Didn't you say that in that report?

A. We did.

Q. So they had hundreds of articles, and you surmise that they didn't review them, correct?

A. Yes.

Q. Who was the chairman of the committee of the 2- -- of the 2009 report?

A. Harry T. Edwards was the co-chair, and Constantine Gatsonis, G-A-T-S-O-N-I-S, was the co-chair.

Q. Now, you referred this morning to what Dr. Rolph said, after the report was published, to reflect back on the meaning of the report.

Do you recall that testimony?

A. Yes.

Q. And that has been marked as K, next in order.

Are you familiar with Exhibit K?

A. Yes, I am.
Q. You've seen that before, right?
A. I have, yes.
Q. And this is a statement by the Honorable Harry Edwards, who is Senior Circuit Judge and Chief Judge Emeritus of the US District Court for the DC Circuit Court, correct?
A. Yes.
Q. You've read this before?
A. I have.
Q. And that's not one of the government exhibits, is it?
A. It is not.
Q. Okay. Turn to page 2.
I'm sorry. Turn to page -- page 1, and read for us the second paragraph.
A. Page 1, right?
Q. Yes.
A. "The committee's project involved an extraordinary amount of time because of the extensive research and countless interviews that we undertook.
"In addition, there were many hours of committee meetings which involved deliberations between forensic analysts and practitioners, experts in the physical and live sciences, a former federal

prosecutor, a defense attorney, a crime lab director, a medical examiner, an engineer, statisticians, educators, and a judge.
"Our interactions were challenging and fruitful. And in the end, despite our differing professional perspectives, the committee was unanimous in its findings and recommendations."
Q. And then read on page 2, the second paragraph.
A. "The committee spent an enormous amount of time listening to testimony from and reviewing materials published by numerous experts including forensic practitioners, heads of public and private laboratories, directors of medical examiner and coroners' offices, scientists, scholars, educators, government officials, members of the legal profession, and law enforcement officials.
"Not only did we examine how the forensic disciplines operate, we also carefully considered any peer-reviewed scientific research reporting to support the validity and reliability of existing forensic disciplines.
"Additionally, we invited experts in each discipline to refer us to any pertinent research. Committee members and staff spent countless hours reviewing these materials.

"And before the report was released it was peer reviewed by outside experts in the fields of science, law, and forensic science."
Q. And had you read that exhibit before you came to court here to testify?
A. Yes.
Q. And despite that report by the head of the committee, your -- you adhere to the view that there was no indication that the committee read the material, the hundreds of articles that you submitted to them?
A. Right.
Q. Okay. Do you have any reason to question the credibility of Judge Edwards?
I know you have expressed in your writings that you don't think judges pursue -- judges and lawyers pursue truth in the courtroom.
But do you have any particular reason why you think that Judge Edwards is not credible in making the statements that he makes in this?
A. Could you please show me where I said that they don't pursue truth?
Q. Sure. I will be glad to.
Do you have any reason to disbelieve Judge Edwards when he states here that he and his committee

carefully -- specifically says: "Not only did we examine how the forensic disciplines operated, we also carefully considered any peer-reviewed scientific research purporting to support the validity and reliability of existing forensic disciplines."
Do you have any reason to doubt the credibility of that statement?
A. I have two reasons.
Q. Okay.
A. The first is that I know that the firearm toolmark examiner that presented the oral -- made the oral presentation in front of the NAS committee gave them virtually no references to support the scientific underpinnings, even though he was asked in kind of an indirect way, but there's no question that he was asked to include that in his presentation, and he didn't do it.
The second reason is that they cite four or five articles that we've already talked about, and that's all that they cite.
Q. But would you have expected the committee to have gone through each and every one of those articles that you provided?
A. I would have certainly hoped that they would.

Q. Would you expect them to, in a report of any reasonable length, to go through each and every article?
A. I thought they would. But after reading what they said on page 7, the self-imposed limitation, I'm not surprised that they didn't.
Q. So one of the reasons why you think that Judge Edwards' statement is not credible is because the presenter did not present any material during his oral presentation?
Am I getting that correct?
A. No. He presented material, but he presented a general overview of firearm and toolmark examination, the kind of a presentation that you might give to a service club.
Q. Kind of like the PowerPoint you gave here? And I don't mean to be derogatory, but it was general in nature?
A. Mine was more specific than his was.
Q. Yours is better than his?
A. No, it was more specific.
Q. Okay.
A. For the -- for the purpose intended.
Q. Okay. And -- and your -- as I understand it, and as your article responding to the committee

states, in addition to the oral presentation, somebody from your organization gave the committee hundreds of articles, according to your written response, right?
Isn't that right in your response?
A. I don't know how many articles exactly. There were numerous articles. It does not say hundreds in the response, but there were -- I don't think it does -- but that they were given many, as early as June in 2008.
Q. Let's see. Take a look at Exhibit 12. In the abstract it says --
A. It says "many of these studies."
Q. It says many of -- my copy of it says: "NAS did not look critically at the scientific underpinning of the firearm and toolmark identification, despite having been provided with hundreds of relevant references."
Do I have a different copy than you?
MS. MOTT: Could we have the page, please?
MR. BURT: It's right in the first paragraph, "Abstract."
BY MR. BURT:
Q. Do you see that in the abstract portion of the paper?

THE COURT: And you're at Exhibit 12?
MR. BURT: Exhibit 12, in the --
A. Yes, it does say that in the abstract. You're right.
BY MR. BURT:
Q. Right.
A. In the text it says "referencing many of these studies."
Q. Right. But in the abstract, at least according to your peer-reviewed AFTE Journal, you provided the committee with hundreds of relevant references?
A. Yes. I didn't personally, but I know they were provided.
Q. And that's separate and apart from the oral presentation, correct?
A. Yes.
Q. So how -- given the fact that hundreds of articles were submitted, how does that cast doubt on the credibility of Judge Edwards, that he reviewed those articles?
A. It doesn't cast doubt. It simply says that they were submitted. They weren't submitted in an official way, unfortunately. They were submitted in an informal way by ex-AFTE President Ann Davis, through her boss, who happened to be a member of the

NAS committee.
Q. And how does the fact that it was submitted relate to your reasoning that Judge Edwards is not credible? I'm not following you.
A. It doesn't.
Q. It doesn't, does it?
A. No. You're confusing the two.
I gave you the two reasons. One reason was because the firearm toolmark examiner provided no scientific underpinning references or articles when he made his oral presentation. He gave a PowerPoint presentation that was very general.
And the second reason is because they cite only four or five articles, and I would have thought that -- I mean, there were a lot of people that are scientists on this committee, and they're used to citing references.
I would have thought that if they would have looked at them and evaluated them, like Judge Edwards said in his statement, they would have listed them. And they didn't.
Q. You had asked me to locate your critique of judges and lawyers for not telling the truth or not being interested in the truth.
Do you remember your article of "Conflicts

Between Managerial Responsibility and the Ethics of Forensic Science"?

A. I believe so. That's a presentation I gave in Adelaide, South Australia, I believe.

Q. And you remember stating there, "the forensic scientist forms the interface between science and the" --

MS. MOTT: Your Honor, we also don't have that exhibit and page reference.

If it's on the CD, Your Honor, we don't have a copy of it.

THE COURT: Wait. Hold on.

So what you are reading from is not an exhibit. Is that correct?

MR. BURT: No, but I'm going to make it such in one second here.

THE COURT: All right. Well, why don't you show it to Ms. Mott.

MS. MOTT: And likewise, Your Honor, I would like to have a chance to review that, since I have never seen it before.

MR. BURT: While she's doing that...

THE COURT: What did you mark that?

MR. BURT: L, Your Honor.

MS. MOTT: I'm going to object, Your Honor,

to relevance. What it appears it be, for whatever reason Mr. Burt is trying to imply that Mr. Murdock is against judges for some reason by randomly seeking out one sentence out of a whole presentation that was based on how this is forensic science. The criminal justice system, lawyers included, are not forensic scientists. So I would object on relevance.

THE COURT: Well, I know that this -- you pulled this out because the witness asked where he had written that judges and lawyers didn't pursue the truth. But -- so I understand why you wanted to show it to the witness.

But why is that particular phrase relevant here?

MR. BURT: Well, I think it's relevant, Your Honor, because there is a credibility issue before the Court. This witness has testified that this NAS committee did not review the materials that were submitted to them.

He's also testified that he questions the credibility of a federal judge in stating otherwise.

And I think, in light of that statement, questioning the credibility of Judge Edwards, the Court is entitled to know that he has a particular slant on judges not being truthful and lawyers not

being truthful, and that that could impact his view that his testimony, and not Judge Edwards' statement, is truthful. That's the relevance of it.

MS. MOTT: Your Honor, I'm still going to object. It's just not relevant.

Plus, he is mischaracterizing what the witness said. In fact, he said he was not questioning the credibility of the judge; he just didn't believe that they had reviewed everything that Ann Davis had presented in a separate section.

We know from the testimony, and from what the person who actually presented to the committee, did. He gave a PowerPoint, he gave no references. It's been gone over ad nauseam, in terms of how many references there were to what articles related to firearms and toolmark identification.

There's no reference within the NAS report that they reviewed any other documents. We do know from the NAS report that they reviewed a variety of forensic sciences, which leads to purport to what Judge Edwards says, that they spent hours reviewing literature.

Well, they reviewed a number, a great number, of different forensic sciences.

Does that mean that the witness somehow is

questioning credibility?

No, that's not what he said. That is a mischaracterization. So this point is not relevant whatsoever.

THE COURT: Well, what is Exhibit L, anyway?

MR. BURT: Your Honor, the witness asked me to produce where he had said -- and I'm not -- the only relevant portion is -- or the proffer of proof -- is his statement, "the forensic scientist forms the interface between science and the criminal justice system. He's called upon to provide law enforcement officers, attorneys, judges, and juries with analytical results and conclusions which help them in the pursuit of their roles; however, they do not have the same degree of interest in finding the whole truth."

And that's what I was referencing when he said, "Well, show me where I've said that."

So that's the only portion that I wanted to just show him, that I wasn't just making that up.

THE COURT: Okay. But tell me what Exhibit L is. What is that?

MR. BURT: Oh, I'm sorry. It's an article written by Mr. Murdock, entitled "Conflicts Between

Managerial Responsibilities and Ethics of Forensic Science." And it is a plenary lecture that he gave, I believe, in 1991.

THE COURT: Well, wouldn't it be just as useful to -- just to show it to him and ask him about that? I mean it's already been discussed. So...

MR. BURT: That's all I was going to do with it. He wanted to see it, and I wanted to show it to him.

THE COURT: Well, go ahead.

BY MR. BURT:

Q. And the only question I have is, that's what I was referring to, and let me move on.

The PowerPoint, in addition to the --

A. Before you move on, may I explain why I made the comment I did, since you brought it up?

Q. Well, you can do it on redirect, certainly.

MS. MOTT: Your Honor, you know, to kind of throw that out there and leave it there and then not allow the witness to respond, I'm going to object to that, Your Honor.

THE COURT: Well, let's just try to get things moving in a positive direction here.

For whatever reason the issue came up. He wanted to see where he said that. Now you have shown

that to him. I think it's reasonable that he explain it now, and we just move on so we can get on to the rest of the material that needs to be addressed here and move off of this side issue.

So go ahead and explain it, and then we can move on.

THE WITNESS: What I meant when I gave this speech, without going back and reading that, is that lawyers and -- and judges pursue justice. People in the crime laboratories pursue truth. They try to distill truth, so there is examination of physical evidence. And it's been my experience that justice is often dispensed, sometimes, by essentially disregarding the truth.

I bore witness to a case where a person was found in possession of heroin, and the Court found him in possession of marijuana because the sentence for possession of heroin would have taken this person off the street, who was trying to make his life better trying to support his family.

And so they simply took judicial notice of the fact that this guy had marijuana on him, and he was given a very light sentence, where if they would have strictly gone by the truth, he would have gotten a much harsher sentence. That's why I said what I

did.

BY MR. BURT:

Q. And does that view color your opinion that there is a credibility issue with regard to Judge Edwards?

A. No, I wasn't commenting on his credibility.

Q. Oh, you weren't?

A. No.

Q. So you are revising your testimony in light of what the government said?

A. No. I simply said that there were --

MS. MOTT: Objection, Your Honor. This has been gone over and been asked and answered.

THE COURT: Well, it's --

MR. BURT: I'll move on.

THE COURT: I get the point.

MR. BURT: All right.

BY MR. BURT:

Q. You reference -- besides the hundreds of articles that got submitted to the committee, you reference the PowerPoint that was given.

Have you ever seen that PowerPoint?

A. I sure have.

Q. Okay.

MR. BURT: If I could approach, again.

BY MR. BURT:

Q. And Exhibit M, just so we have a record of what we're talking about, is that the -- sort of the committee agenda for the days that the toolmark identification got presented?

And attached to it, the PowerPoint presentation that was given to the committee?

A. Without counting the pages, this looks like the entire presentation.

Q. Okay. And it's your testimony that, although the -- your organization, this AFTE organization, was aware that this NAS panel was meeting, your particular group did not make any effort to communicate to them other than the -- sending them hundreds of articles?

A. AFTE didn't send them hundreds of articles. I --

Q. Oh, they didn't?

A. No. It was just one individual who happened to be an ex-president of AFTE, Ann Davis, who happened to be working in the same laboratory where an NAS committee member was. It was her boss.

So she knew he was going to these meetings. She knew the importance of the NAS committee. So she offered these and said, "Please consider them."

Q. Was your committee -- I think this committee that you're -- you kept saying that you're the chairman of that committee, is an AFTE committee?
A. Yes.
Q. AFTE is a group of law enforce- -- primarily law enforcement people who earn their living at firearm and toolmark examinations, correct?
A. I don't think they are primarily law enforcement people. They're not primarily sworn officers. Most of them happen to work in association with law enforcement organizations, however.
Q. You have to be somebody who earns your living -- primarily earns their living doing toolmark and firearm examination comparisons to be a member. Isn't that true?
A. I believe that's a requirement.
Q. Okay. So the members of this group, this AFTE group, are people who primarily make their living doing the types of comparisons we're talking about, correct?
A. Yes.
Q. And the committee that you kept saying you're the chairperson of, that committee was -- had some title like the committee for the advancement of science, or something like that?

A. The science of firearm and toolmark identification. That's correct.
Q. Who came up with the name?
A. I don't know.
Q. Well, you were the -- you kept telling us you're the chairperson.
A. I am the chairperson, and I don't know who came up with the name.
Q. When -- when was that committee formed?
A. It was formed about four years ago.
Q. So was it formed after the 2008 report but prior the 2009 report?
A. It was formed right in that time period. I don't know exactly.
Q. Was it formed because of the 2008 report?
A. I don't know. I don't know why it was formed. I was just asked if I would -- if I would chair it.
It actually started out as an ad hoc committee, and then it was converted into a standing committee a year or so ago.
Q. And the purpose of the committee was to actively advocate the advancement of your -- of your field, correct?
A. Yes.
Q. It was an advocacy role, right?

A. It was to respond to inquiries, things of that nature.
Q. Well, the formal definition, according to your AFTE website, is: "The committee will have the following goals: To actively advocate the advancement of the discipline and stand prepared to respond to requests from the media, research entities, and other appropriate bodies regarding requests for information on the science of firearm and toolmark identification."
A. That's correct.
Q. And in your role as advocate, was that how this report in response to the 2008 NAS report got published?
A. In our role as responding to criticisms, inquiries, that's why we responded. We were asked -- my committee was asked to -- to write a response.
Q. And that response came out before the 2009 report came out?
A. I believe so, yes.
Q. And was there any discussion within your committee that, "Hey, you know, the NAS is sitting again at another committee that's looking at the scientific validity of our field, and we ought to kind of organize and get together and present to them

our view of this, because we've already got one NAS report out there that's critical of our field, and it's -- it's important to us to get our views across."
Was there any kind of discussion about that?
A. In retrospect, there certainly should have been.
Q. Well, was there?
A. But there wasn't.
Q. So this committee for the advancement of the science, you -- you personally knew this other NAS report was convening?
A. I think I did. But like has already been pointed out, AFTE is a volunteer organization, and most of us have full-time jobs. And so I don't spend a great deal of my time outside of that. I -- my committee responds to a request from the board of directors. Sometimes we generate our own -- our own requests to the board of directors, but it's the board that decides everything.
And the board asked us to respond, and we crafted a response. They reviewed it, made editorial changes, and then it was sent in.
The same thing with our committee response

to the NAS report. It's the board of directors that the response comes from. We just drafted the report and then they edited it.

Q. And the -- you also testified about another document that you submitted to this committee -- presidential committee, right?

A. Well, the subcommittee on forensic science, the SOFS committee, yes.

Q. Right. And that -- was that just a recycling of the hundreds of articles you submitted to the 2009?

A. What does "a recycling" mean?

Q. I mean resubmitting the same literature. In other words, it was submitted to NAS. You say it didn't get considered. Now, are you giving the same literature to this --

A. I'm sure that there were some of the same articles, but I've never gone back and actually made a list, any kind of an official list of the materials that Ann Davis gave to the NAS committee member.

Q. You don't --

A. I haven't done that. So I don't know which articles were referenced on the materials Ann gave to the NAS committee member. I don't know. I'm sure that there were some that are duplicative of the ones

that we put and submitted in our 94-page list to the SOFS committee in June of last year.

Q. Okay. And how many of those articles on that list post-date the 2009 report?

A. There are a number of them, but I don't know how many.

Q. How many?

A. I have no idea. I haven't counted them.

Q. But a lot of them duplicate the same stuff you already had submitted to the NAS 2009 committee, right?

A. Well, like I said, I didn't -- I never compared the list.

Q. Now, what is your understanding of the type of weapon that is involved in this case?

A. I think there's semiautomatic pistols involved, and there might even be some sort of assault rifle.

Q. But on the cartridge case identifications that were made, what particular type of weapon?

A. Well, I think perhaps both of those kinds. I don't know exactly. I didn't do the work.

Q. And you have no idea of the particular brand and model of the weapon that -- or weapons that are at issue in this case?

A. I don't remember.

Q. Did you at some point have that information and you just forgot it or...

A. Yes.

Q. I see.

Now, a lot of the literature in your field is weapon specific, correct?

A. Correct.

Q. In the sense that examiners analyze weapons or toolmarks and they find something unusual about them, and then they write into the AFTE Journal and say, "Look what I found."

I'm simplifying it. But that's...

A. Yeah. That's fine. That's right.

Q. Okay. All right. And -- and that's important, is it not, in particular comparisons? In other words, if you have a particular gun -- and in this case we are going to hear testimony that the gun at issue is a .40-caliber Smith & Wesson, what's called a VE. Are you familiar with that gun?

A. I'm -- just generally, but not specifically.

Q. Do you know what VE stands for?

A. No, not right offhand.

Q. I'll tell you what the company told me, and you tell me if it is wrong. Value enhanced.

A. I don't know whether that's right or wrong.

Q. How many .40-caliber Smith & Wesson value enhanced pistols have you examined?

A. Very few. I don't know how many, but not many.

Q. And I think you testified this morning that looking at the particular tool that makes the mark is very important, correct?

A. It is important. But also looking at the mark that is made can give a person as much insight into whether there's -- on the presence or absence of subclass characteristics.

Q. And also looking at the literature on that particular tool, if such literature exists?

A. Yes.

Q. Now, do you know what the shell casing match is based on in this case?

A. No. I think it's -- I take it it might be based on -- on the breech face marks.

Q. Right.

A. And there might be some -- some of the firing pin aperture shear marks that I -- that I discussed earlier. I actually showed a couple of examples of those.

But I don't remember exactly what it's based on.

Q. Sure. Let me ask you to assume, for purposes

of my questioning, that there's going to be testimony here that the alleged murder weapon here was a Smith & Wesson .40-caliber VE, and that the cartridge case identification for that weapon is based on breech face identification.

A. Okay.

Q. Okay?

Now, since you didn't look at the evidence -- or you are not offering opinions about the evidence -- just in general, given that scenario it would be important, would it not, to know what literature there is out there about what kind of marks the particular type of weapon make on the breech face end of the cartridge?

A. Yes.

Q. That's what the idea is based on?

A. Yes.

Q. You would want to look at the actual weapon and the surface that -- as in your PowerPoint -- that flat surface that the cartridge jams up against to imprint the mark?

A. You either can look at the weapon or you can look at the -- at the primer, which is in the center of the base of the cartridge case.

The primer is soft metal. And because of

the tremendous pressure involved there will often be great contact between the primer and the toolmarks on the breech face. So good, in fact, that it's like casting the breech face with silicone rubber.

And casting is -- is an acceptable way to evaluate a tool working surface for subclass influence. For example on extractors, it's very -- most of the time we don't want to take the extractor out of the gun. It's hard to get out, and you just don't have to do it, so we cast that surface.

The casting material flows under the edge of the extractor, and we pull out the cast. We look at the cast under the stereomicroscope and we evaluate the toolmark, the working surface of the extractor, by looking at the cast of the toolmarks.

Well, by the same token you can look at the primer of a fired cartridge. And if the contact has been good, if there has been a faithful reproduction of the breech face -- of the toolmarks, you can indirectly evaluate the tool working surface by looking at the kind of toolmarks that are stamped into the primer.

Q. And you would also want to look at the literature about the particular weapon at issue?

A. Yes.

Q. In particular, you'd want to know -- one of the issues that you have mentioned are subclass characteristics?

A. Yes.

Q. You want to know if anybody has found subclass characteristics for the particular kind of comparison that you are making?

A. Yes, for that particular gun. And then evaluate the one that you have in your particular case, to see if the same kind of manufacturing toolmarks are present. They may be or they may not be.

Q. Okay. And you mentioned this morning this Rivera study. Do you recall that testimony?

A. I do.

Q. And when was that study published?

A. I don't know when Gene Rivera -- when he -- that was a number of years ago, I know that. Maybe five or six years ago.

Q. And what was the thrust of the study, if you recall?

A. They were using IBIS, as I believe, and they happened across two -- two test firings from different guns that showed remarkably similar scores. And when they looked at those, they found that the

same type of subclass characteristics, very prominent striated marks that started on one side and continued virtually unchanged over to the other side, were present on both guns, and those toolmarks matched.

They matched so well that if no subclass would have been there, they would have been identified as being -- being the -- being created by the same tool working surface. But they were, in fact, two different tool working surfaces.

The marks looked very similar to the marks that I showed on one side of the bolt cutters in my PowerPoint. They were fairly uniformly spaced. They were -- but the main thing is that they were continuous. So the thought is if they're continuous across this entire surface, the breech face on one gun, you might very well expect them to be continuous in a similar way on another breech face.

Q. Right. And they had a particular pattern to them?

A. Yes.

Q. And the concern, as I understand it -- and you correct me if I'm wrong -- is that these subclass characteristics are going to be confused by the examiner with the individual characteristics?

A. They could be.

Q. When in fact, if it's really a subclass characteristic, it's not an appropriate basis to make an identification.
A. Yes. They could be confused, but it's not axiomatic that they will be confused.
Q. Right. But the point of the article is, "I found remarkable similarity in two different guns. They're known non-matches," in your lingo, right?
A. Exactly, right.
Q. So what he's reporting on is, "I've got two guns here. And when I'm looking at the shell casing imprints made by these two guns, I'm seeing something remarkably similar."
A. Yes. That's the take-home message.
Q. Okay. And so just so I have this right, he's -- the concern that he's writing about is, "We'd better be aware of this because people could make an erroneous identification if they confused what are really subclass characteristics with individual characteristics."
A. Absolutely right.
Q. And so one of the things that an experienced examiner would have to do is know what patterns he found through his photographs and sort of compare that, if you get a -- whatever weapon was he was

dealing with.
A. Yes.
Q. Right?
A. Yes.
Q. And that applies to all these subclass characteristic issues. In other words --
A. Correct.
Q. -- you would have a bibliography which talks about this problem, and the problem is a potential confusion between subclass and individual characteristics?
A. Yes.
Q. So for the examiner in the crime lab, that person has to be aware of that literature in order to -- not to get fooled into making the identification which really is an incorrect identification?
A. Correct.
Q. Okay.
MR. BURT: Now, let me mark this next exhibit as N.
BY MR. BURT:
Q. Is this the paperwork on it?
A. Yes, it is.
Q. And the particular weapon that he was examining

was the Smith & Wesson SW40VE Sigma pistol, right?
A. Yes.
Q. Which I'll represent to you in good faith is the exact same weapon that's going to be testified about in this case.
A. Okay.
Q. Okay? So it would be your testimony that this article would relate directly to a comparison, assuming it took place in this case, between shell casings fired from a Smith & Wesson 40VE?
A. Yes.
Q. And it would especially apply because the kind of subclass characteristic he found is a breech face subclass characteristic?
A. It is, yes.
Q. Correct?
A. Yes.
Q. I think your PowerPoint demonstrated there can be different subclasses at different points on the cartridge.
A. Yes.
Q. But he's talking about a subclass characteristic that was found on the breech face.
A. Yes.
Q. And is there -- can you demonstrate where, in

his photos, and kind of walk the Court through how these are subclass characteristics and how it looks similar and how an examiner might be fooled into making an identification here?
A. Well, one of the best examples is on page 251 in Photograph Number 5.
On the left, you have an illustration of the breech face impression from the pistol serial numbered PBV7152.
Q. Uh-huh.
A. And on the right you have a test firing from pistol serial numbered -- it's -- it's also the P -- PBV7164. So there -- these two cartridge cases were fired from different firearms.
And then we -- what you see is a comparison of breech face marks on the primer. And these, of course, were created by that stamping operation I have already described.
And this amount of agreement, if they were in fact -- if it wasn't subclass characteristics -- would be enough to identify this breech -- these two cartridge cases as being fired in the same gun.
But the interesting thing is, if you look at the photograph right below it, there were other parts of the -- of the firearm that left individual

marks. So you could use other toolmarks to identify -- to show that these guns mark differently.

So these are -- these are firing pin aperture shear marks that we have talked about, and those are different.

So each of these guns leaves a different firing pin aperture shear mark, even though the subclass stamped toolmarks are remarkably similar.

Q. So the take-home message for the careful examiner would be better -- if you're going to make an identification of a cartridge case from a Smith & Wesson 40VE, better to rely on the shear mark and not on the breech face?

A. That take-home message would be true if the particular gun that you were examining exhibited the kind of continuous toolmarks that we see in Photograph 5.

Q. Uh-huh.

A. If they do not, if the marks that are exhibited in the gun that you say is the gun in question in this case --

Q. Right.

A. -- if those marks are more random in nature, they start and stop, they move off in an angular position without -- without any indication of this

very smooth continuous movement across the breech face, then in that case, even though it's the same make and model of pistol, the examiner could conclude, based on the appearance of the breech face stamped marks in test firings, that they -- he or she was dealing with a unique tool working surface.

Q. And did you look at the photomicrographs in this case to see if the breech face comparison showed the kind of similar subclass characteristics that were present in these photomicrographs?

A. I did look at them.

Q. And what did you think?

A. They didn't look like the ones that are in this article.

Q. And why do you think that?

A. Because of the appearance of them. They were angular, they started and stopped. This -- it was a different kind of tooling operation than was -- than was used on these.

Once again, I just looked at the photographs. I didn't look at the actual exhibits. But the photographs were -- were good. They were high-quality digital photomicrographs, and I could see the breech face stampings clearly.

Q. But the -- do you have that photograph that you

looked at?

A. No.

THE COURT: You will have plenty of time to look for that, because --

MR. BURT: Oh, I'm sorry.

THE COURT: -- it's time for us to break for the day. So we'll reconvene tomorrow morning at 9:00.

Court will be in recess.

Oh, one question. Is this Exhibit N?

MR. BURT: N, as in Nancy.

THE COURT: All right. We'll be in recess.

CERTIFICATION

I certify that the foregoing is a correct transcript from the record of proceedings in the above-entitled matter. I further certify that the transcript fees and format comply with those prescribed by the Court and the Judicial Conference of the United States.

Date: August 22, 2012

PAUL BACA, RPR, CCR
Certified Court Reporter #112
License Expires: 12-31-12

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