(The Court was at ease.)

THE COURT: All right. Are we ready?

MR. ROSE: Yes.

THE COURT: All right. Let's bring the jury back in, please.

I'm just telling the jury, we're calling a witness out of turn.

MR. ROSE: Yes, sir.

THE COURT: All right.

(The jury entered the courtroom.)

THE COURT: All right. Ladies and gentlemen, the defense is going to call a witness. The State has not rested yet, but the defense is going to call a witness out of order, so you should listen carefully to his testimony, just like any witness, because he is a witness in the trial for the defense, but we are allowing him to call the witness -- the defense to call the witness out of order, all right.

Go ahead, Mr. Rose.

MR. ROSE: Thank you, Your Honor. The defense calls William Tobin.

WILLIAM TOBIN

was called as a witness and, having first been duly sworn, testified as follows:

THE COURT: You can proceed.

MR. ROSE: Thank you, Your Honor.

DIRECT EXAMINATION

BY MR. ROSE:

Q How are you this afternoon, sir?

A Pretty good, sir. How are you?

Q I'm well.

Please state your full name for the record.

A William Tobin, T-O-B-I-N.

Q What is your current occupation, Mr. Tobin?

A I'm a forensic material scientist metallurgist, independent consultant.

Q What specialized qualifications do you have to qualify you as a forensic metallurgist and material scientist?

A I have a bachelors of science degree in metallurgy from Case Institute of Technology in Cleveland, Ohio. I continued my formal education at graduate school at Ohio State University and George Washington University, and at the University of Virginia.

Q Okay.

A I acquired practical experience from my employment as a plant metallurgist at Chase Brass and Copper Company, at Monarch Aluminum Company. And in research, as a research metallurgist with the National Aeronautics and Space Administration, and Battelle, B-A-T-T-E-L-L-E, Memorial

Institute. And I've spent 27 years as a special agent in the Federal Bureau of Investigation. I retired. The last 24 of my 27 years was as a forensic metallurgist and I retired in 1998 as the head of the metallurgy, forensic metallurgy operations at the FBI laboratory.

I visited numerous metal manufacturing and processing plants throughout the United States, and Taiwan. I have been a guest speaker for the prominent metallurgical associations in the United States and in Canada. I have authored numerous publications in the field of forensic metallurgy and material science. I lectured to four or five universities as a guest lecturer. I believe that's the best I can recall right now.

Q Okay. I suspect I'm probably going to be kind of downing you back a little bit, as you testify, and explain some of the terms you use. Just to be sure, explain to us what metallurgy is?

A Metallurgy is the science and technology of metals, materials and alloys, it's very close to material science, which is the science of solids and fluids. Fluids being liquids and gases.

Q So you work for the FBI for 27 years?

A Yes.

Q What were your duties and responsibilities with the FBI?

A Well, the first three years I was what we call a street agent. I investigated organized crime and police corruption in Chicago, in general crimes. And I was transferred to Detroit, Michigan, working general crimes there, primarily interstate transportation of stolen property and some fugitives, and some other types of cases. I was transferred in 1974 to the FBI laboratory as a forensic metallurgist where I spent the remainder of my career.

Q And while you were at the FBI, did you conduct toolmark examinations in conjunction with your metallurgical duties?

A Yes.

Q How often did you do that?

A I would estimate roughly around once a week for the 24 years.

Q And does the FBI, or did, while you were working there, have firearm and toolmark examiners?

A Yes, they did.

Q Okay. Did you ever have occasion to interact with the toolmark examiner's work in the Federal Bureau of Investigation?

A Yes.

Q Tell me about your interaction and what you did with them, so-to-speak?

A Well, we would mutually consult on various cases, if I needed some assistance with Nomenclature or functioning of a firearm. I would request assistance from them and, likewise, they would periodically come to me and ask me to explain why they were seeing what they didn't expect to see in the field of view or, conversely, why they weren't able to see what they expected that they should see. So they were mutual interactions.

Q How frequently did you interact with the firearm and toolmark examiners at the FBI?

A Well, that's -- that's not something I maintained a log about, but I say once or twice a year, maybe.

Q Okay. Now, when you were working with the FBI and their toolmark examiners, did you use the same methodology, equipment and instrumentation used by the toolmark examiners?

A Yes, when I was performing the toolmark examination, yes.

Q Okay.

A I did outfit, periodically, the comparison microscope with some advance scientific instrumentation called interferometry for interferometric examinations, but that was only for a brief period of time.

Q Interferometry?

A I'm sorry, that's I-N-T-E-R-F-E-R-O-M-E-T-R-Y.

Q I'm more concerned about you explaining what it is, not really the spelling of it, but I'm sure she appreciates that.

A That would be primarily an analysis of the wave reflection from the surface of a material. It's typically -- it can be characteristic for residual stresses or when there's some slight deformations that will show an optical pattern, like a rainbow, basically.

Q Are you a member of any professional scientific organizations?

A Yes.

Q Which ones?

A That would be the American Society for Metals, the American Society for Testing of Materials, the National Association of Corrosion Engineers, the Society for Experimental Mechanics and I believe there are some others that -- I don't have my C.V. in front of me.

Q Would it help you if you had your C.V. in front of you; would that help refresh your recollection?

A Yes.

Q Please take a look.

A And I also belong to the Minerals, Metals and Materials Society, and the American Foundry Society, among others.

Q What types of research projects have you worked on

in your career?

A I've worked on researching the ethicacy of practice in the forensic arena of arson and fire investigation. We conducted some research to determine the validity of the forensic practice at a particular time.

I then conducted with colleagues, research into a practice that had been admitted in courts for 35-plus years, known as comparative bullet-lead analysis, to determine whether that was a scientifically valid practice or not. And we have conducted research into the firearms toolmarks practice, as well. In addition, colleagues and I have -- we actually received a 2008 statistics chemistry award for our research into the John F. Kennedy assassination.

Q Who awards that particular award?

A That was from the American Statical Association.

Q Okay. Now, the arson and fire investigation research that you did, can you be more specific about that?

A Yes. There was a practice that investigators used for significant claimed -- significant probative value relating to collapsed furniture springs, mattresses and chairs, and they were -- it would be typically -- offered in courts as indicia of whether an accelerant was used or whether a long, slow smoldering fire, for example, from a cigarette might have been the cause for a fire. We eventually determined that --

MR. CLARY: I'm going to object to relevance.

MR. ROSE: It has to do with his qualifications.

THE COURT: Qualifications as to what?

MR. CLARY: As to what?

MR. ROSE: As to his scientific opinions of how metals work and react. Everything he has to talk about has to do with metals.

THE COURT: All right. I'll overrule the objection. Go ahead.

THE WITNESS: So I researched -- addressed the scientific validity or lack thereof, of the particular forensic practice.

The question was on the arson and fire?

MR. ROSE: Correct.

THE WITNESS: Okay.

BY MR. ROSE:

Q Okay. Now, tell me about your research with regard to comparative bullet analysis.

A We actually -- that practice was in -- typically after crimes bullets would be recovered from scenes of crimes.

MR. CLARY: Again, relevance, Your Honor.

MR. ROSE: It has to do with metals --

THE COURT: Metals --

MR. ROSE: And forensic practices of metals.

THE COURT: We'll see what he's qualified to testify to and he's trying to establish that right now.

MR. ROSE: Correct.

THE COURT: So I'll overrule the objection.

THE WITNESS: The forensic practice involved comparing -- bullets that couldn't be compared for typical firearms toolmarks called ballistics. And in physics and material science, we know that term is inappropriate for the way it's used. But if a bullet is too deformed or damaged, the next choice or examination of choice would be, at that time, to compare the compositions of bullets from a scene with bullets recovered from a premises of a suspect. And at that time the practice was that, if the compositions were considered analytically indistinguishable, in other words, sufficiently similar in the examiner's opinion, it was then declared to have originated from the same source. And that -- it was the first phase of that research.

The second phase of the research was what we call in marketing, the demographics of distribution of the product, which is critical to determine probative value. The working hypothesis was to determine whether there were concentrations of same product in local regional areas that would render probative value

extremely, to be very limited or useless. That was the second phase of our research project.

Q What was the end result of it?

A Of the arson and fire or the bullet?

Q Bullet.

A The bullet lead, what we found, we found astonishing concentrations of same product in local areas. We actually tracked six product lines and set up an experiment to determine the hypothetical chance of an innocent purchaser, purchasing bullets from a particular outlet, over the six product lines of the same composition, and what we found were something like 79 percent, 89 percent, 100 percent, 100 percent and 100 percent, meaning, those were the chances that an innocent purchaser would purchase bullets of the same composition that were used in a crime.

That's very similar to the working hypothesis derived from when I was a consultant in the ammunition industry, as well. In other words, product distributions are not homogenous throughout a geographic territory. There are concentrations, because these products are boxed, palleted and shipped to local regions.

Q They're shipped to local regions based upon determinations made by the company, not randomly?

A Well, by determining -- by the marketing and by

the customers.

Q Of course.

What was your final determination in the arson investigation?

A Similar -- similar we confirmed, and the field finally acknowledged that the practice was, in fact, junk science, so they have discontinued using collapse springs in furnitures and bedding as an indicator of whether arson was involved or not. And on the comparative bullet lead analysis, the FBI finally exceeded that it was not -- had no probative value and they have since discontinued use of comparison bullet lead analysis as a forensic practice.

Q Have you ever been on a television program, I think 60 Minutes?

A Yes.

Q Okay. And what was that as a result of?

A That was as a result of our comparative bullet lead analysis.

MR. CLARY: Your Honor, I'm going to object. Bolstering.

THE COURT: Sustained.

BY MR. ROSE:

Q When you -- when you challenged the aspects of the fire and arson investigator, were you a fire and arson investigator?

A Yes. I had -- I'd done many fire and arson investigations, but I was not a certified fire investigator. I did that for the FBI and we were charged by congressional mandate to provide assistance to all duly authorized law enforcement agencies throughout the United States.

Q You were not certified?

A That's correct.

Q And when you were doing comparative bullet lead analysis and challenging that forensic practice at the time, were you a qualified bullet lead examiner or certified by any organization in order to challenge that?

A No.

Q Ever conducted a bullet lead examination?

A Have I ever?

Q Yes.

A I had, but not in the way that they were practiced by the practitioners. I had done specialized circumstances where metallurgical material science issues arose on bullets, but not in the manner that was offered for probative value, as the examiner's themselves did.

Q Are you a certified firearms examiner?

A No.

Q Are you member of AFTE?

A No. I do not belong to any member of any trade associations, other than the First Marine Division, I guess.

Q Okay. What is -- what is -- okay.

Well, why are you not a member of AFTE?

A It's not a scientific body and my plate is -- it's immensely full. I don't have time to participate in any non-scientific endeavors, other than, again, the First Marine Division Association.

Q How many papers have you published in the field of forensic metallurgy or material science?

A My best recollection, as I sit here, is 18 -- 17 or 18. I would have to count them, they're on my C.V.

Q Do you have any papers pending for publication at the moment?

A I do. I have two papers pending for -- they have been accepted for publication.

Q When do you expect them to be published?

A The first one in law probability and risk will be published in winter of 2003 [sic] so it's in the next few months. It's already available online.

Q And the other one?

THE COURT: This is 2012.

MR. ROSE: I'm sorry.

BY MR. ROSE:

Q Did you say 2003?

A Oh, did I?

THE COURT: Uh-huh.

THE WITNESS: 2013, I'm sorry.

THE COURT: Has it been published already?

THE WITNESS: No, Your Honor. I'm sorry. 2013.

BY MR. ROSE:

Q And the other paper?

A The other paper will be a few months after. It has been approved for publication in 2013.

Q Are both of these indexed journals?

A Yes.

Q What does that mean for a journal to be indexed?

A That is typically a vetting process for a publication to a certain entity, for example, the Institute for Scientific Information or I.S.I. (Thompson, I.S.I.) is the rigorous vetting entity that vets these journals to make sure that they comport to rigorous scientific -- true scientific standards and will authorize and begin to index them in their graphic index services. It's also -- the S.C.I, which is the Scientific Citation Index.

Q Is the AFTE journal indexed?

A It is not indexed, no.

Q Is it available outside, to the general scientific community?

A No. In fact, that is a major complaint in its true scientific and academic communities. They generally do not have access to those journals, to those papers or

manuscripts.

Q Your papers, have they been peer reviewed?

A They have been much more rigorously peer reviewed, yes.

Q And that is -- what is that process called?

A That process is called refereeing.

Q What is refereeing?

A Refereeing is a process used in the scientific community, where, for example, my last several papers, they -- the manuscript is sent to the editor. The editor or I will redact the authors' names, send it out to the true scientific community to be critiqued. The referees will actually critique the manuscript, send their suggestions and criticisms or both good and bad, back to the editor. The editor will then redact the referees' names from the paper and send the suggested edits back to the original author. That's what is called a corresponding author. So that is a very rigorous process where names and entities are not known.

Q What are the titles of the papers pending publication?

A They're long names. May I refer to my notes?

Q Of course.

A One of them is entitled Analysis of Experiments in Forensic Firearms and Toolmarks Practice offered is support

for low rates of practice error and claims of inferential certainty.

The second paper --

MR. CLARY: Your Honor, could we -- it's unclear to me which one he's talking about, which of the two articles. One has been subjected to peer review, where he's claiming it's going to be published and the other one is pending review. So could he --

THE COURT: Would you clear that up, Counsel?

MR. ROSE: All right.

BY MR. ROSE:

Q You've got two papers pending publication, correct?

A Yes.

Q Have they both been peer reviewed?

A Yes.

Q Have they both been refereed?

A Yes. I've indicated that they both have been accepted for publication, which means, it's prima facie, an indicator they have both been refereed, rigorously refereed.

Q Okay. Prima facie meaning what?

A It's -- it means that it's an absolute requirement that if they're accepted for publication, they had to have been refereed.

Q Okay. So both your papers have been refereed?

A Yes.

Q Peer reviewed and accepted for publication?

A Yes.

MR. ROSE: Does that clear up the question?

MR. CLARY: Yeah.

BY MR. ROSE:

Q Okay. You've told us about the title of those. Tell me about the kind of substance? How about a brief overview?

A Well, may I refer to the abstract?

Q Certainly.

A The first paper that will be appearing in law -- the Law Probability and Risk is basically, it critically evaluates experiments that have been conducted and used by the firearms and toolmarks community to justify inferences or opinions of specific source attributions. In other words, this object -- this item or this bullet or cartridge cases was fired through this weapon was a process known as individualization or specific source attributions. So what we do is critically evaluate the experiments that they have -- that have been conducted over the periods of decades to justify specific source attribution processes, and then with claims of 100 percent certainty or a reasonable ballistic certainty or any of the other expressions of certainty, that will typically be associated with their

opinions.

And we indicate -- we then suggest approaches for how the field can begin to lay proper scientific foundations and point out the enumerable flaws in their experiments that have been confirmed by the National Academy of Sciences as inappropriate.

Q Now, let's see.

Have you won any awards in the course of your professional activities?

A Yes.

Q What are they?

A I received three cash awards from two different FBI directors. I received a Letter of Commendation from the United States Attorney General. I've received several hundred Letters of Commendations from prosecutors. And I've also -- we also received a 2008 statistics and chemistry award for the J.F.K. assassination research.

Q The Letters of Commendation from the Attorney General, from prosecutors, would that have been for your work while you're with the FBI?

A Yes.

Q Have you been qualified to -- have you been qualified as an expert in the field of forensic metallurgy and materials science or tribology before?

A Yes.

Q What is tribology?

A Tribology is the science of essentially friction lubrication and wear of surfaces in contact with each other and in relative motion, which is basically the governing science -- true science, which is a subsection of metallurgy and material science and mechanical metallurgy, that governs the interaction of bullets and barrels, firing pins with cartridge cases, extractors, ejectors and so forth.

Q How many times have you testified as an expert witness?

A Excluding my two congressional testimonies, I've testified in 241 proceedings in 44 jurisdictions. I would say states, but DC is not a state, so. . .

Q Have some of those been in civil litigation as opposed to criminal litigation?

A Yes.

Q Have you testified both for defendants and plaintiffs in those cases?

A Yes.

Q How many times have you testified with respect to firearm and toolmark examinations?

A Using the term ballistics, I -- I think, when I last counted, minimally 16 or maybe 18 times. But that breaks down into internal ballistics and terminal ballistics, and internal ballistics.

Q Have you ever testified in the great State of Florida before?

A Yes.

Q How many times have you been qualified as an expert witness in Florida State Courts?

A Sixteen times.

Q Okay.

A At least 16 times, sorry.

MR. ROSE: And Your Honor, at this time, we would proffer Mr. Tobin as an expert in the field of forensic metallurgy and material science, and a member of the revolving scientific foundation for assessing the scientific foundation in firearms and toolmark examination.

MR. CLARY: The State would like to voir dire the witness.

THE COURT: Absolutely.

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VOIR DIRE EXAMINATION

BY MR. CLARY:

Q In the 226 times you've testified as an expert, was that primarily related to metallurgy?

A Not to -- I don't mean to be argumentative, but it was 241 times.

Q Sorry about that.

A So I'm sorry.

Q So the 241 times, was that primarily in the field of metallurgy?

A Yes. They would all be metallurgy and material sciences, yes.

Q And how many times did you testify in the area of toolmarks -- tool -- in toolmark identification?

A Well, depends on how that term is defined, but I indicated in the field of ballistics, whatever, 18 times or 16 times.

Q In the field of ballistics. What do you mean in the field of ballistics?

A Well, practitioners use the term ballistics as, maybe, in the CSI arena, but that would be break down to nine times in firearms identification cases. I think there were four in terminal ballistics.

Q What is terminal ballistics?

A That is a very complex -- it's the interaction of thread and target material when a projectile interacts with target material. It's called thread material and target material, but that would be where the effects of what happens during the interaction, at a very high-strain rate of high velocity interaction.

Q So when one metal intersects with another metal, i.e, a projectile hits another metal object or another

target, what happens there?

A Except the target material doesn't have to be metals, it can be other materials, but yes, that's primarily correct.

Q So this wasn't in the -- that wasn't in the realm of firearms analysis in comparison with cartridge cases; is that right?

A Terminal ballistics cases, no.

Q What other situations have you testified regarding firearms analysis or comparisons?

A Well, the nine would be virtually identical to the case at bar --

Q Could you tell me what circumstances had -- one second.

So it's nine more times -- nine times you have been called to -- that you're saying you've been qualified as an expert in firearms comparison?

A I was qualified to address the same issues we're dealing with, but as a forensic metallurgist, material scientist.

Q So not in toolmark identification or firearms comparison --

A To address the scientific unrepining or lack thereof in firearms identification, yes.

Q But you've not been qualified as a toolmark or --

you've not been qualified a firearms analyst or toolmark expert; is that correct?

A Well, now, a toolmark expert, yes, but not proffered as a firearms identification expert. If that's what -- in those words, yes -- or no.

Q You don't have any training as a firearms identification expert; is that right?

A You would have to define what any is and then what firearms identification is, because the issues are basically tribological issues that are strongly metallurgical material science based. So I would have to -- if you mean, did I ever undergo any training by firearms practitioners in their practice? No.

Q Okay. Did you ever go through any blind testing regarding identifying a shell casing being linked to a particular firearm?

A No.

Q So you had -- basically, you had no proficiency in that realm; is that right?

A No. I don't hold myself out nor do I allow myself to be proffered as a pattern -- I'm sorry -- as a firearms identification expert. I don't like that term, but that's a legal term.

Q How many cartridges have you compared in your career as a law enforcement officer?

A I don't have any way of capturing that. For example, it would be -- the U.S.S. Iowa case.

Q You stated you didn't -- you consulted once a year with firearms analysts while you were with the FBI; is that right?

A Well, I'm saying that would be a rough average, once or twice a year where I would be asked to give -- provide some guidance as to why they were -- why the metal was behaving in a way they had not expected or vice versa, why they didn't see certain characteristics or traits they wouldn't have expected.

Q So they consulted you for the metallurgical reactions or why something -- why the interaction with metal; is that right?

A Sure. The consultation was not to address the fact of a claim to match or exclusion.

Q So you never made bullet matches or comparisons while you were with the FBI?

A I'm sorry, bullet?

Q I mean -- I'm sorry, shell casing comparisons while you were with the FBI?

A Well, that's not true either.

For example, in the U.S.S. Iowa case, that's basically what I was doing, trying to associate a -- I don't remember if those were 8-inch or 16-inch guns, but I don't

address the issues, generally, of the fact of a claimed match. I do address, however, the scientific methodology or lack thereof at arriving at an opinion as to whether or not it's scientifically acceptable or objectionable.

Q So you're not saying that a firearms examiner can't make a match between a bullet -- sorry -- a shell casing and a gun?

A What is that --

Q You're just establishing the science behind it?

A I would disagree with the term. You have to define what match means and maybe I can save -- well --

Q Establish that one bullet or shell casing is consistent with having been fired from a firearm.

A Sure, and that was totally acceptable in the current --

Q Isn't it true that has been used in courts for the past century?

A Yes.

Q And have you actually done any studies, personal studies, regarding toolmarks on shell casings yourself?

A On any studies?

Q Have you conducted any scientific studies on the matching of toolmark -- toolmarks on shell casings, fired from different guns?

A Here's the difficulty I'm having. I don't, again,

address the claim of a truth of the matter, whether it's a claim -- I'm sorry -- whether it's a, quote, match or not a match. The problem is the term match in the first place. What does that mean? Association would be a better term, but yes, I --

Q What about it being consistent --

A -- believe that --

COURT REPORTER: I'm sorry. One at a time.

BY MR. CLARY:

Q What about it being consistent with being fired from that particular firearm?

A I have -- my colleagues, nor I, have no problem with the claim of consistency. We do have serious claims with the claim of a match, when it means individualization or a specific source attribution, that is scientifically unfounded, so I guess --

Q This Court has made a ruling on that. The Court has made a ruling on that and explained that to the jury. So what -- what is it your -- what I'm trying to find out is, why you have -- I know your articles that you're publishing are critical evaluations of other people's studies; is that right, in the area of firearms analysis?

A Yeah, that's probably a short summary. Yes, I would accept that.

Q Trying to make it simple --

A Yes. Thank you.

Q -- so we can understand.

So you took a bunch of other people's studies and work product, and you basically critiqued the way they did their study; is that right?

A Sure, yes.

Q Okay. Now, is that the same thing you did when you were doing the comparative lead-bullet analysis?

A Yes.

Q But when you did the comparative lead-bullet analysis, didn't you do a study on your own?

A Yes. Well, actually, we did two studies. Yes, in the first case. And I guess the answer is, yes, we did two studies.

Q And the difference between that and this is, you haven't done any studies in the area of firearms analysis or identification; is that right? You haven't conduct any personal studies of that?

A Well, yes, I did perform one experiment to support a working hypothesis within the field, but again --

Q You're not publishing that experiment?

MR. ROSE: Objection, Judge. He needs to let the witness answer the question.

THE COURT: Let the witness answer.

THE WITNESS: Again, all I and my colleagues are

doing is addressing the validity of all of these purported studies that have been used for decades that claim support for the practice, which is -- so in other words, by necessity, we are reviewing the processes by which they are arriving at their opinions and what are known as inferences.

BY MR. CLARY:

Q Okay. Now, when you're doing the comparative lead-bullet analysis, that was in the FBI unit, right?

A I'm sorry --

Q The comparative lead-bullet analysis, that was done by an FBI -- part of your organization that you belonged to at the time?

A Yes, sir.

Q Okay. And was that the only agency in the world -- in the United States that was conducting a comparative lead-bullet analysis, at the time?

A That depends on which time you're talking about. The answer is through the decades, yes, but there were intermittent situations, where, for example, the Alcohol, Tobacco and Firearms tried it and then the California Department of Justice tried it for some period of time and both ended up concluding that it was an unreliable practice and they terminated it.

Q And basically, that analysis wasn't subject to

peer review because it was only being done primarily by the one agency; is that right?

A That's pretty correct. It was an insular community that -- and again, as similar to firearm toolmarks, there's very little, if any, extra judicial interest in -- or in other words, used outside the courtroom or the law enforcement community, for the actual science of what was going on.

Q But now, firearms and -- firearms analysis and toolmark comparison is practiced worldwide, not just in one law enforcement agency or one -- what do you call it; testing facility; is that right?

A Sure. But in answer to your last question, and where you're going here, I was addressing within the United States, comparative lead-bullet analysis was done in Germany, Italy, Belgium, I believe. In fact, I have a colleague in Belgium. So it was done in other parts of the world, as well.

Q So what are your problems with the comparative lead-bullet analysis study? I mean, the procedures or methodology, was it the fact that it didn't have any peer review; isn't that right?

A Yes. Yes, exactly.

Q And that's why their information was flawed, right?

A One of many reasons. Part of it was, they needed -- required access to a nuclear reactor for the first 25 years. And even scientists, true scientists, might have an interest in that and didn't generally have access to a nuclear reactor.

Q Isn't your field of expertise really the interaction of metals?

A Yes.

Q And --

A Well, it doesn't have to be the interaction. It's metals and materials, and with their environment.

Q Now, when you were with NASA, what was your job there?

A I had several duties, but typically it was research in nuclear materials compatibilities, uranium carbide, plutonium carbide, and we were conducting what is known as creep testing, as well. At the time, one of the moon shots was intended to be a nuclear -- to be a nuclear propulsion, so we were studying the compatibilities of the materials of the fuels.

Q Now, while you were doing that, you were working for NASA, you didn't do any firearms analysis or toolmark analysis; is that right?

A No, that's correct.

Q When you were with the -- when you first started

with the FBI, you were involved in -- you were a detective or an agent, right?

A Yes, I was an agent the whole --

Q The whole time you were an agent?

A The whole time.

Q You were a street or field agent, as opposed to being in a -- in a laboratory; is that right?

A That's correct, yes.

Q And when you switched over and became a metallurgist with the FBI, you had limited exposure to firearms analysis; is that right?

A Firearms analysis?

Q Comparisons, other than when it was -- when there were some weird metallurgic reaction inside of it?

A In the spirit of giving you -- literally, I was imminently familiar with combat and with the FBI for firearms, but not the actual, what I think you're driving at is the actual comparative aspects of the --

Q The comparative analysis of a particular shell casing to another shell casing?

A That's correct.

Q And determining whether or not those shell casings could have been fired from the same firearm?

A That's correct.

Q And the one experiment you say you have conducted,

that hasn't been subject to peer review; is that right?

A No, it was an informal experiment.

MR. CLARY: Okay. No further questions at this time.

THE COURT: All right. Let me have both of you up here, please.

(The following was held at the bench.)

THE COURT: I'm going to find he's an expert to testify in the area of metallurgy. He is not an expert in --

MR. ROSE: Judge? Judge?

THE COURT: Let me finish, for the record.

MR. ROSE: Sure.

THE COURT: He is certainly not an expert on firearms identification.

MR. ROSE: No.

THE COURT: Nor on identifying projectiles with regards to a firearm, he is not an expert in the field.

MR. ROSE: That's not the point of his testimony.

THE COURT: Well, what he can testify to is what he found in metallurgy. Now, I'm not -- I'm not even convinced he can testify as to how the -- I'm really torn about this -- about whether or not the science used with firearms identification expert is flawed or not. I'm not sure he's qualified to testify to that

because he's never done any kind of work himself. He studies that and wrote a report on it.

MR. ROSE: Judge, he is absolutely qualified to testify to that. He has -- he is a metallurgist. He's a scientist and by virtue of testifying -- of being a materials scientist, he's testing the way the metals are working --

THE COURT: I understand all his qualifications.

MR. ROSE: He is testing as to whether or not something is a match and that has nothing to do with his qualifications. His qualifications have to do with his knowledge of metals, the science of metals.

THE COURT: I will let him testify to that.

MR. ROSE: About how those react and by virtue of that, that qualifies him to testify to the problems with the firearm identification because -- match because those are not -- those are not specific to firearms. Those are -- those problems and issues are the subclass.

THE COURT: He can testify to those issues, but he could not, under any circumstances, say that these bullets, shell casings, did not match that firearm.

MR. ROSE: No, no. He's not going to testify to that, no. He can't. He's not qualified to -- offering for a purpose. We're offering him as to the

problems -- the problems with the science, not the functions of her identification.

THE COURT: I think he's qualified to testify as to the problems with the science from a metallurgy standpoint.

MR. ROSE: Yes.

THE COURT: That is it.

MR. ROSE: Judge, he is not going to testify --

THE COURT: From a metallurgy standpoint, he can't testify as to what he sees that the problems are, but as far as whether or not her findings were accurate or not accurate. He is not qualified to testify to that.

MR. ROSE: Judge, his -- his ultimate opinion is that -- is that they can testify -- he can testify to it being consistent, and then he's going to testify to a great deal of the problems with the science. He is not going to testify -- he would not let someone try to get him to testify to a problem with a declared match or anything like that. That is not what he does.

THE COURT: All right. Thank you.

Go ahead.

(The following was held in open court.)

THE COURT: Let's get into the meat.

MR. ROSE: Yes, sir. The meat.

THE COURT: Does he need to come down there with

you?

MR. ROSE: No, Judge.

Mr. Tobin, you're doing fine sitting, correct?

THE WITNESS: Yes, sir.

MR. ROSE: You just have to spin around there.

THE WITNESS: (Complies.)

DIRECT EXAMINATION (CONTINUING)

BY MR. ROSE:

Q All right. Mr. Tobin, tell me first what -- how you would define metallurgy and materials science.

A Both are the study of solids and fluids, and their interactions.

Q And now, there's this big colorful slide up here, tribology. What is tribology?

A That's a subset of metallurgy and materials science and mechanical engineering that governs or describes the interactions of -- for the particular case at bar, it would be the interactions of the bullet with the barrel, interactions with the extractor and ejector firing pin with the cartridge casing.

Q What about the rear -- would it also cover, as in this case, the contact with the back of the shell casing or the breech face?

A Yes, it would.

Q Okay. Thank you.

Can you give us an example of the tribology and considerations in the firing of a weapon?

A Well, they actually begin when the trigger is pulled. The interactions of the components with each other and with the -- eventually with the cartridge, all of those will involve tribology interactions.

Q Metallurgy, material science and tribology, what's all this got to do with toolmarks?

A The interactions are what generate the characteristics used by firearms examiners, what are typically striations or impressions.

Q Okay.

A Or impressions of striations in the case, for example, a breech face mark.

Q Okay. In addition to performing extensive toolmark examinations during your career, you've researched and reviewed the domain literature?

A Yes, extensively.

Q And you've heard Ms. Murphy's testimony?

MR. CLARY: Your Honor, one of the jurors is indicating she couldn't hear what was just said.

THE COURT: You need to speak a little louder, Mr. Rose, please.

THE WITNESS: I'm even having some difficulty in --

MR. ROSE: Okay.

THE COURT: Believe me, he can speak louder.

MR. ROSE: I'll do my best. If -- Judge, I don't want to speak directly to the jury, so if they're still not able to hear me, have them wave at you.

THE COURT: Well, you can speak directly to the jury --

MR. ROSE: Please, speak up, wave or something of that nature, I want to make sure everybody hears.

THE COURT: If everybody can hear, please -- can you hear all right?

If any of you, at any point, can't hear the testimony, please raise your hand. You should have been doing that the whole trial, okay.

All right. Go ahead.

MR. ROSE: And thank you for saying that.

BY MR. ROSE:

Q So you've heard Mr. Murphy testify as to her toolmark analysis, correct?

A Yes.

Q Okay. And what are the characteristics used by toolmark examiners for comparisons?

A The categories?

Q Yes.

A As she indicated, there would be class

characteristics and subclass characteristics and purportedly or allegedly, individual characteristics.

Q Okay. And striations and impressions, how are these things left?

A How are these things what?

Q Left on the -- in this case, on the back of the shell casing?

A Well, as Ms. Murphy indicated, striations would be -- probably the simplest terms would be scratches, linear scratches, impressions are typically the result of transfer of characteristics under compression, when two items are compressed into each other, like clay, maybe up against an object, when you pull it up, you can see the characteristics the sub-trait --

Q All right. There are categories, as Ms. Murphy discussed, of characteristics for toolmarking -- or the characteristics observed in toolmark examinations and what are class characteristics?

A Well, as she indicated, they're characteristics generated generally by design. In other words, they're designed into the bullets or barrel. In the sub -- I'm sorry --

Q Subclass?

A Subclass would be incidentally derived from production, for example, those are the overwhelming majority

of them. In other words, they are developed fortuitously by interaction of the tool that's forming the piece with the item, with the work product.

MR. CLARY: Your Honor, I'm going to object as to relevance with this line of questioning. We're not talking about projectiles here. We are talking about shell casings.

THE COURT: I think he is talking about shell casings. I believe that is what he's discussing.

MR. ROSE: He is. He's talking about the generalities at the moment.

THE COURT: Yeah. Well, you're talking about the impression and I'm not going to get into that. Overruled.

BY MR. ROSE:

Q Okay. You discussed subclass characteristics. What are the alleged individual characteristics?

A Individual characteristics are, by definition, only unique to that particular item. But there's serious controversy in the true scientific community about whether they, in fact, exist or not and how they are labeled as individual.

Q Assuming that individual characteristics exist, how would the examiner know the difference between a subclass and an individual characteristic?

A Well, as has been said numerous times, that's the 900-pound gorilla in the room. If the examiner cannot discern the difference, then what he or she is comparing belongs to an unknown size, possibly large production lot. All products that derive from this particular set of tooling in the factory, so those would be the subclass characteristics.

Very controversial about how a subjective -- totally subjective practice can arbitrarily label characteristics as individual. There is -- as we'll see here -- there's been no comprehensive or meaningful studies ever establishing the existence of individual characteristics, for examiners to be able to claim to be able to match.

Q Now, there's a picture of a microscope. Tell me the significance of that?

A Well, that's basically the comparison microscope that Ms. Murphy indicated that she used, and I used for 24 years. And all this basically shows is how it's configured -- the object is configured. The questioned sample would be put on one stage of the microscope and a known sample would be put on the other stage, near the -- the images are channeled up through a bridge. And then the two views are merged together in the eyepiece, the field of view. And on the right side of this particular slide, it

shows what an examiner might see under a microscope. And note the black line separating the questioned and the known sample. So in this case, it would be a comparison of two different cartridge cases, with breech face marks on the particular cartridge case. The lower one just shows two bullets actually being compared with each other.

Q All right. Now, let's talk about the A.F.T.E. theory of identification.

What, in your opinion, in the true scientific community, is problematic about the theory of identification?

A The theory of identification is not a scientific protocol. It is virtually purely subjective. The terms in it are -- first of all, it contains what are known as fallacies of presumption.

Q What does that mean?

A Fallacy is a mistaken belief, based on unsound judgment. But the primary fallacies that exist in this theory is that they assume -- what we say is they contain premises that presume what they purport to prove. In other words, they're asserting as fact, circumstances that have never been shown to exist scientifically. For example -- should I --

Q And in the theory of identification, let's talk about some of these terms. Toolmarks enable opinions of common origin to make a unique surface an insufficient

agreement. What does sufficient agreement mean and what is problematic about that?

A What I've done with this particular slide is use colors to show the most vague subjective terminology and it's called circular reasoning, as well. But to show -- for example, look at the word sufficient. What does sufficient mean? It has no operational meaning. It means anything the examiner wants it to mean. Your determination of sufficient is different than my assessment of sufficient and may be different than the Court's assessment of sufficient.

What is agreement? Same thing, it means anything the speaker wants it to mean. The items in red, which would enable the opinion of common origin and practical impossibility are what are known as fallacies of presumption. It begs the question. In other words, they're assuming that uniqueness exists by claiming that this, quote, theory enables opinions of common origin. In other words, they're presuming that uniqueness exists and there's a serious issue with the fact of whether uniqueness exists or not. Which we'll probably get to shortly.

But the bottom line is, this entire protocol -- it's finally said that it's based on the examiner's training and experience. And in the true scientific arena, our main treatment -- community training and experience are inappropriate for scientific proof. In fact, the scientific

community has operated for hundreds of years, trying to eliminate -- eliminate as much as subjectivity as possible and that's why they require specific protocols, so that the hallmarks of the true scientific approach, which would be repeatability and reproducibility can eliminate as much subjectivity as possible.

Q What's bad about subjectivity in science?

A There are only two methods of reasoning, logic. If I may?

Q Sure.

A There's deductive logic and then there's inductive logic. Deductive logic is the case where an experimenter can capture the entire possible sample -- excuse me -- and test all the samples.

Let's say I make the statement that all Chevy Novas ever made are blue. If we had a bombing and we find a vehicle label plate that says "Nova," you can properly deduce that the car was blue. That is a proper use of deductive inference. But in those circumstances, where you cannot test every single possible sample in the sample pool, one must use what is known as inductive inference.

So firearms toolmarks, every firearm cannot be tested, obviously. So the only proper way to render a scientifically acceptable opinion would be to take proper samples and then render an opinion that has a properly

designed expression of certainty to it, based on established procedures.

The purpose of that is to eliminate subjectivity. Some of the, what's called pathological science, that has existed throughout the years, Polywater, cold fusion, you probably remember that, were based on subjective implications. And in most of those, there's a big red flag that goes up when an experimenter says, well, you can't trust my photographs because they didn't see what I really saw under the microscope. Or you can't trust my data because I have other data -- no, it has to be reproducible, so training and experience is not an acceptable form of proof in the scientific community.

Q Okay. So getting back to A.F.T.E. theory of identification, what is the -- what is the problem with regard to the examiner's memory as it regards training and experience?

A What the theory of identification basically requires is an examiner to look at striations or impressions, and decide at the time, does this constitute what they would call an association -- actually, I will use the term match -- a match or not. But then it requires them to look back on all of their thousands of cases and try to remember spatial relationships, interspatial relationships of -- nature's most elementary geometric form is a line.

There's basically almost no unique mental tags to remember what a line looks like.

So now they're called upon to recall all of the combinations and interspatial relationships of the lines that they've seen through years and thousands of examinations. That is a --

MR. CLARY: Your Honor, I'm going to object because the witness doesn't have a basis for his statement, Your Honor.

MR. ROSE: I don't understand the objection.

THE COURT: Well, I think what his objection is, he's not an expert in that area.

MR. CLARY: He has not compared thousands of bullets and done any of that.

MR. ROSE: Well, what -- he's testifying to -- he's not testifying to having done it. He's testifying to problems with the A.F.T.E. theory of identification as identified in the A.T.F.E. theory of identification. He's only testifying as to the logic of it, with regards to the scientific community, not to how it's done or how they do it.

THE COURT: All right. I'll overrule the objection.

Let me have both of you up here for a minute. This is off the record.

(A conversation was held off the record.)

BY MR. ROSE:

Q All right. Moving ahead.

Let's talk about individualization. The concept of individualization. How is that regarded as it pertains to individualization in the firearms and toolmark community? How does the scientific -- the true scientific community view that idea or that concept?

A The true scientific community considers individualization a fallacy. They do not accept the ability of examiners to conclude an individualization or a specific source attribution.

Q When you say individualization --

MR. CLARY: Your Honor, I'm going to object again. Your Honor, can we approach?

THE COURT: Yeah.

(The following was held at the bench.)

MR. CLARY: What type of individualization is he talking about?

THE COURT: Here's the problem. He's got to explain which scientific community doesn't accept this. He says the true scientific community. Who the heck is the true scientific community?

MR. ROSE: That's fine.

THE COURT: And that predicate hasn't been laid as

to who they are.

MR. ROSE: That's fine.

THE COURT: All right.

(The following was held in open court.)

BY MR. ROSE:

Q Now, you've used term "true scientific community" a few times. Explain to me what -- who the true scientific community is as it pertains to the problems with firearms and toolmark examinations. What types of scientists are we talking about?

A Well, we're talking about metallurgists, material scientists, mechanical engineers, chemists; all those who have had hardcore, true scientific training.

MR. CLARY: Your Honor, I'm going to object because the witness can't testify to that.

Can we approach again?

(The following was held at the bench.)

MR. CLARY: He's not established that he's a member of any of those scientific organizations.

THE COURT: He didn't -- you have to be -- I just looked up some case law. He doesn't have to be a member of that, but he has --

MR. CLARY: Reviewed.

THE COURT: -- to have some sort of background with metal -- he's saying that based on -- he's making

a --

MR. CLARY: A broad generalization.

THE COURT: -- that's a good point -- that every -- that the entire -- metallurgists and mechanical engineers and none of them accept this. You know, it's just too broad.

MR. ROSE: Let me limit him to metallurgy and --

THE COURT: That's what he's an expert in.

MR. ROSE: That's fine. No problem.

(The following was held in open court.)

BY MR. ROSE:

Q As we're discussing the true scientific community, since you are one of the metallurgists and a material scientist, but now let's limit it to what they think of this.

A I'm sorry?

Q Limit your comments with regard to what the true scientific community is, to what material scientists and metallurgists opinions are.

MR. CLARY: Your Honor, may we approach, briefly?

(The following was held at the bench.)

MR. CLARY: Can you do a curative instruction to the jury, based on that? Because they've already heard him say that the scientific community analyst -- all these communities. And he's only an expert in the area

of metallurgy.

MR. ROSE: That's fine.

(The following was held in open court.)

THE COURT: All right. Ladies and gentlemen, what I'm allowing him to testify, as an expert in the field of metallurgy, and -- correct, Mr. Rose?

MR. ROSE: Metallurgy and material science.

THE COURT: Okay -- and material science, that is what he is being allowed to testify as an expert in. Whether he is an expert or not, or whether you believe his testimony or not, you will hear an instruction from me at the end of the case, this goes to this gentleman and would go to the State's witness, Ms. --

MR. CLARY: Murphy.

THE COURT: -- Murphy. Whether you consider them to be experts or not, and want to accept their testimony or reject their testimony, that is totally up to you as jurors, and that will be part of your final jury instructions. But he is being allowed to testify in this particular case as to metallurgy.

And what was the other part of it?

MR. ROSE: Materials science.

THE COURT: Materials science, okay.

He is not -- for purposes of this trial -- he is not qualified as a firearms identification expert by

any -- by his own acknowledgment; is that correct, Mr. Rose?

MR. ROSE: Yes.

Mr. Tobin, you don't claim to be a firearms toolmark examiner expert, correct?

THE WITNESS: Not -- not on firearms identification. Toolmarks, yes.

THE COURT: But not on firearms identification and shell casings; you are not an expert in identifying whether a particular shell casing came out of a particular firearm?

THE WITNESS: That's correct, Your Honor.

THE COURT: Okay. Do you understand, ladies and gentlemen?

JURY PANEL: Yes.

THE COURT: We're trying to limit this, so that we can get down to what the defense wants to show you here.

Okay. Thank you very much. Go ahead, Mr. Rose.

MR. ROSE: Very good.

BY MR. ROSE:

Q All right. So individualization or the idea -- to recap, the idea that something can be specifically found to have come from something else, a manufactured item, that is, never caught traction with the metallurgy and material

science for science?

A That's correct, for good reasons.

Q Okay. Now, let's talk about the scientific method. What are -- tell me -- describe the scientific method to me.

A Trying to keep it as short as possible and quickly, it's basically a technique that's been developed through the ages to eliminate subjectivity in empirical induction process, in other words, experimentation. So you generally start out with a premise or a hypothesis, or a problem. You then conduct experiments. You make observations in the experiments. You analyze the data from your experiment. And then you make a determination as to whether these data support or what's known as falsify your working hypothesis. If they falsify it or are not consistent with the premise, then you need to go back and revise your premise. It's an iterative loop. Well, I guess we do have it -- it's an iterative process.

Q What does iterative mean?

A I'm sorry. You do the process over and over until you -- until the results are consistent with your hypotheses or at least to support it. You can't prove it. You can never prove it inductively, but at least it supports your original premise.

So the feedback loop is required for that

repetitive process or iterative process. And that is a major problem in the field of firearms toolmarks. The feedback loop does not exist.

Q Why is that a problem?

A Because the -- the field does not have what is known as access to ground truth.

Q What is ground truth?

A Whether or not this is -- these are, in fact, individual characteristics that the examiner is looking at.

The basic scientific problem is that, as we show in the upcoming papers, scientists are probably in agreement -- and I'll say materials scientists are probably in an agreement that uniqueness does, in fact, exist above the subatomic level. Yeah, above the subatomic level. The problem, though, and what we've concluded is that uniqueness is virtually -- basically irrelevant to any particular case.

What is very relevant, however, is whether a human observer can discern that uniqueness. In other words, how is a particular examiner going to discern whether this line is unique to this item or not. So in other words, there's the -- I think we could go to the next slide.

MR. CLARY: Your Honor, again, I'm objecting. He's testifying outside of his field of expertise.

THE COURT: Overruled. He's -- go ahead.

THE WITNESS: So basically, the two questions are,

does uniqueness exist, but scientists now agree that that's basically irrelevant. The critical issue --

THE COURT: Hold on a second. What scientists?

THE WITNESS: Materials scientists.

THE COURT: Okay. Let's try to stick to that, if you would.

THE WITNESS: When I say scientists --

THE COURT: All right. When you're saying scientist, for the jury's sake, you're meaning material scientists?

THE WITNESS: Yes. But I collaborate with my colleagues on a weekly -- daily, if not a weekly, basis. And these are other coauthors who are writing papers with me, the pathologist [sic] and another chemist, statistician; all of these are in our collaborative research efforts.

THE COURT: All right. Go ahead.

THE WITNESS: I'm sorry, I forgot.

So the two key questions are, does uniqueness exist? We're all in agreement that above the subatomic level, it probably does exit. For example, with two water bottles, they're probably unique somewhere along the line. The key question is, though, can a human observer discern or detect that, what makes those two bottles different. And that's the, again, another

900-pound gorilla in the room.

BY MR. ROSE:

Q Okay.

A And we've already discussed deductive and inductive.

Q Okay. Now, do you have an example of how a validation study may not be valid?

A Yes. Basically, it's known in the scientific -- true scientific community that you can never prove, in hypothesis, inductively by what's called simple enumeration. In other words, you can't just go out and grab a bunch of samples and start testing them and prove your theory. What you can do is -- there are established techniques for being able to do that, but the demonstrative example to show how the folly of trying to resort to grabbing ten samples of anything --

MR. CLARY: I'm going to object to this as speculation.

THE COURT: Well, I think experts can speculate in their field.

MR. ROSE: They can.

THE COURT: Go ahead.

THE WITNESS: So for example, in their validation studies, they will typically obtain ten sequentially manufactured firearms and compare them.

MR. CLARY: Your Honor, I'm going to object, again. This isn't his field. He's talking about firearms comparison. He's not talking about metallurgy.

MR. ROSE: He's going to talk about whether or not there was a claimed match. This is a statistical analysis. This really doesn't -- he could be talking about any number of different items; would that be fair to say?

THE WITNESS: Yes, that's correct.

THE COURT: But you're using guns --

MR. CLARY: Yes, Your Honor.

THE COURT: -- as your example.

MR. ROSE: But he is not going to talk about whether or not there's a -- any problems with a claimed match; that's not the point of this at all.

THE COURT: All right. Go ahead.

MR. CLARY: Your Honor, I would --

THE COURT: I understand your objection.

MR. CLARY: I have another objection.

THE COURT: All right.

MR. CLARY: Since he's talking about statistical analysis, I would like to voir dire the witness on statistics.

THE COURT: I believe he said he had a degree in

statistics or studied statistics at some university, but go ahead.

- - -

VOIR DIRE EXAMINATION

BY MR. CLARY:

Q What statistics classes have you taken in your career?

A I've had -- I have to look at my C.V. It's considered an overlapping discipline with materials science, metallurgy. Most scientists today are required to take statistics courses. And, in fact, daily, I can literally say daily I collaborate with professional --

Q What I'm asking is what statistic courses have you personally taken, not collaborations with other people or statisticians. What statistic courses have you personally taken in your career?

A I've taken Statistics 1, Statistics 2, two calculous courses and I've taken applied statistics for engineers and physical scientists. And got an A triple plus in that course, by the way.

So those are the official, but statistics is incorporated and we include that in our upcoming papers.

Q So you've taken -- you've taken three statistical classes, is that correct, in total?

A At least three, but they're subsets within some of

the hardcore sciences that we study.

Q Do you have a math major or minor?

A No.

Q You don't have a math major or minor?

A No.

Q So these are basically related to the science classes you were taking?

A Yes. It's a necessary part of the true scientific material science of metallurgy.

Q One of these classes was scientific statistics; is that right?

A Yes.

Q Or something like that?

A Yes, applied statistic for engineers and physical scientists.

Q Okay. Do you have an engineering degree?

A It's a science engineering degree, yes.

Q Do you have a metallurgy degree?

A Yes.

Q Okay. And regarding statistics, did you do any of the statistical analysis in any of your -- in the study -- let's go with the compare lead-bullet analysis. Did you do any statistical analysis in that?

A Yes.

Q You did?

A Yes.

MR. CLARY: One second, Your Honor.

THE COURT: Mr. Clary, I think the issue is how could he arrive at this conclusion?

MR. CLARY: Well, it's also his basis in statistics and, Your Honor, may I approach?

THE COURT: Yes.

(The following was held at the bench.)

MR. CLARY: This is also just based on his transcript in this case. He has mislead the Court and I'm trying to find it right now.

THE COURT: The jury?

MR. CLARY: He said that he did an analysis on -- at this point, Your Honor, do we need -- at this point he's basically just mislead (indiscernible).

THE COURT: You got to speak up for her.

MR. CLARY: In my reading of the transcript from the case in Maryland, it's *State of Maryland versus Henry Whitten* (ph) the reporter's official transcript of proceedings, it indicates that he did not do any statistical analysis that was done by the other two writers of the paper, Your Honor. So that's what I'm getting at this point.

THE COURT: So why don't you ask him about that in your quick voir dire. But the problem is -- you know,

I'm telling both of you guys, the jury is glazing over with this testimony, so. . .

MR. ROSE: I'm going to get through this.

THE COURT: Okay. And we still have another witness.

MR. CLARY: I've got to find this really quickly.

THE COURT: All right. Go ahead.

MR. ROSE: You got it?

MR. CLARY: Your Honor, I'm sorry, I didn't know this was going to come up, but otherwise --

THE COURT: Let's go off the record for a minute.

(A discussion was held off the record.)

THE COURT: He may want to do further voir dire, but go ahead with your questioning.

MR. ROSE: That's fine. We'll come back to this.

(The following was held in open court.)

BY MR. ROSE:

Q All right. Let's talk about subclass versus individual characteristics, Mr. Tobin.

All right. Now, the image that's on the screen, does that come from a study done by the A.F.T. -- that's published in the A.F.T.E. Journal?

A Yes.

Q Okay. Tell me what is significant about that image on the scene in terms of the problems between subclass

characteristics and the alleged individual characteristics?

MR. CLARY: I'm going to object, Your Honor. He's not qualified to testify regarding comparisons in tool -- in firearms analysis, Your Honor. He's a metallurgist.

THE COURT: He's talking about the metallurgy. Overruled. Go ahead.

BY MR. ROSE:

Q Go ahead.

A Well, now I forgot the question.

This basically shows the similarity of toolmarks, how virtually indistinguishable two different samples are. Here's the split screen image again. This was presented in the AFTE community as having been fired from two completely different weapons, noting the similarities of these is quite remarkable and that would be consistent from a material science, metallurgy, as a former plant metallurgist, as to what I would expect to see with weapons that come off of the production line fairly contemporaneously.

Q Okay. So subclass characteristics are what specifically?

A Those generally derive from the manufacturing process. In other words, the tooling that forms or cuts or shapes a particular work product will most often impart the same -- essentially similar characteristics from product to

product to product, and there are metallurgical reasons for that occurring.

Q And individual characteristics to the extent that they exist?

A Well, those are supposedly by definition unique to one particular work product or weapon in this case.

Q Okay. Now, what are some of the problems that exist for defining subclass versus individual?

A Well, basically there are no defined criteria offered to examiners as to how they're supposed to determine, when they see a line or a couple of lines, are these individual or are they subclass? In other words -- and I've noticed in our research that we have found no literature describing to examiners; how they're supposed to be able to tell whether these came from fabrication or whether these are supposedly individual characteristics to this gun. Which begs the question, how do trainees train their charges -- or train their new examiners behind closed doors, if there's no literature out there describing this. How are they -- if you can't communicate it in public domain, how are you communicating it behind closed doors?

So the bottom line is, there's no literature describing the process of how to tell the difference between subclass and individual. And there have been -- we found no meaningful or comprehensive studies, ever, as to how you can

discern manufacturing marks from supposedly individual marks, and not rely on superhuman memory to try to remember the lines. It's basically been characterized in the scientific community as a practice of, I know it when I see it. Again, the fallacies of presumption. You're presuming what you're looking at are individual characteristics when there's been no proof whatsoever, ever shown as to whether they are or are not individual. And again, there's no feedback loop for error detection because the field does not have any access to the ground truth.

In other words, is this item truly individual or is it essentially similar to every other weapon in the possible 10,000 guns that came out of that production or 100 guns or whatever.

Q Okay. What are some of the other problems with the methodology for distinguishing subclass and individual characteristics?

A Well, I think I've already indicated, but to this day there's no working methodology or operational methodology for examiners to be able to claim a mark is not a subclass characteristic, but rather, is individual.

We can skip this next one. The significant errors and misattributions that have been made, are almost entirely a result of an examiner believing that they were individual, when, in fact, they were subclass, coming from the

manufacture.

Q Now let's -- with regard to the subclass versus individual problems, what are some of the signs in your field that show that this is a real -- real and true problem for the firearms identification field?

A There are numerous studies and numerous literature indicating that -- in some of the studies, for example of known matches, they have found that somewhere between 20 and 38 percent of concordance, in other words, of the lines matched --

MR. CLARY: I would object, Your Honor. Who is they?

BY MR. ROSE:

Q Who's they?

A I'm sorry?

Q There was an objection. Just qualify that.

A The experimenters or authors of the paper or the studies.

MR. CLARY: I'm going to object again. What paper? What study?

THE COURT: Sustained. You have to lay a predicate for that.

THE WITNESS: I don't memorize every paper, but I'm actually citing one from *Miller* here.

BY MR. ROSE:

Q Okay.

A The studies have shown that the number of characteristics that are dissimilar, and this is most often the case, exceed the characteristics that are similar. And there's a reason for that. The National Academy of Sciences have confirmed that after their studies that there is immense variability from shot to shot, even within the same firearm because the charge, the powder in there, you cannot exactly duplicate from shot to shot, the pressures, and/or the metal-to-metal contact, so there is going to be some variability from shot to shot.

And the field studies have confirmed and the one I'm citing here by *Miller*, that there were more -- the different weapons, and in that study, I believe they show 52 percent lines that matched up from two totally different weapons. So again, this is a subjective practice. So what we're basically saying is, showing that guns from -- known to have fired a certain projectile or cartridge cases are showing 20 to 38 percent concordance, and yet, no non-weapons are showing up to 52 percent.

Q No non-weapons?

A I'm sorry. No non-matched weapons are showing up to 52 percent matches of characteristics. And the second warning sign that the problem is real, and I would cite, AB -- study AB 17, 17, which is a study by Dekender (ph) I

didn't have it on the slide there. What they found confirms the scientific position, because what happened was, examiners would enter digital images of their known matches. In other words, they test-fired into a database. And as time went on, what would -- let's say, they would go to conduct inquiries of that database and typically the known matches come up in the top ten or 15 candidates.

However, as more and more test-fires began to be entered into the system, it turns out, surprisingly to the experimenters, that the known candidates did not even appear in the top ten or 15 candidates after so many entries. In other words, the computers were identifying weapons that were even better matches than the known matches.

So in other words, what I'm saying here in this slide is, that as the federal databases grew, the no non-matches appeared closer to the more likely candidate than the actual guns from which they were fired. That is a serious red flag saying that the problem is real on discerning subclass from individual characteristics.

Q Let's talk about defects in technology. Has the firearm industry, as well as, I suppose, any other industry has the ability to mass produce more and more firearms created a larger problem in a sense, for the fire and toolmark field?

A It has, yes.

Q How is that?

A When I was a plant metallurgist in charge of the tool and die operations -- the heart and nerve center of production typically is the tool and dies. They're very expensive, and production continuity is a critical issue depending on the macroenvironmental circumstances --

Q And wait, wait, wait. Macroenvironmental circumstances, what does that mean?

A Macroeconomics. In other words, what kind of demand -- is the production running 24/7 or are they -- is the economy and the recession and, therefore, they're only running one shift. But the bottom line is, production continuity, more often than not, is critical. It's up to the plant metallurgist to keep the production running. Obviously, that's how they make money.

Q What do you mean when you say production continuity? What do you mean by that?

A Keep the bench presses or forging presses, or whatever operations are going -- keep them running with little or no downtime, ideally.

Q Okay.

A And in fact, what typically happens when there's a tool or die change is, if it's running 24/7, you have to just quickly stop production and put a new die in. You don't have time to resurface that one. That's how critical

sometimes the production continuity is. But it's been the goal of metallurgists and material scientists, for decades in production, to keep the tool and die life -- keep wear down to an absolute minimum, because of this production continuity issue.

So typically, the dies are comprised of tungsten carbide and other extremely hard materials. So what you --

Q Let me stop you for a second.

To the extent that not everybody is familiar with a manufacturing plant, explain what tool and dies are, and how they're used to make things like firearms.

A Well, like for example, at Chase Brass & Copper, the tool or die would be the drawing die, where the tubing is pulled through an orifice and formed into a tube or a wire. So the tool or die would be the actual item through which the product is pulled to be shaped.

For the purposes of weapons, and in this particular case, the tools and dies would be those that are -- were used to generate or form to final shape, and condition the breech face, in this particular case.

Q What's the difference between a tool and a die?

A They're interchangeable, pretty much.

Q When you say tool and die, in your field, what we're talking about, there's really no substantive difference (indiscernible) --

COURT REPORTER: I'm sorry, substantive difference?

BY MR. ROSE:

Q -- there is no substantive difference between the two, they're interchangeable terms; is that correct?

A That's correct.

Q Okay.

A So the bottom line, in answer to the question, is over time there have been technology -- technological improvements to the tool and die operations, and to a very critical component that has been ignored by the firearms toolmarks community, and that is in lubrication matters to reduce the friction that causes the wear. So what's happened over a period of time is larger and larger production lots have ensued from the technological advances.

So let's just say, picking numbers, 40 years ago there might have been a thousand weapons or weapon components manufactured on a certain forging bench or broaching [sic] bench [sic] or whatever, but now it might be 10,000, because of advances in lubrication and advances in the tool and die materials.

On the second part of the slide, the manufacture, advantages or what's called C.N.C, that's Computer Numerical Control. That has allowed, now, to reduce the human intervention issues. Now the computers are actually keeping

very tightly controled circumstances over the production. So that alone has allowed an increase in the eventual number of tools that comprise a lot or a batch of firearms.

Q And they become more durable, as well?

A Yes.

Q And now -- okay. And this relates to the issue of whether a characteristic then, that an examiner would see, is subclass, meaning it's going to be in every single -- that characteristic is going to be in every single gun or whatever tool in that batch of guns made, at that time or whatever item, or if a mark is allegedly individual, okay.

Now, how do these problems relate to what the difficulty for an examiner to tell whether something is subclass, meaning it's consistent across an entire batch or perhaps individual?

A They can't.

Q How do these issues relate to that?

A Well, let's just keep the simplest case. Let's say I'm the plant metallurgist and I'm standing right at the bench when these products are coming off. Let's say a forensic examiner comes in and takes ten weapons that are sequentially manufactured out of the process. What is a critical parameter that has been ignored is, what's the state of the lubrication system? For example, did I just change it before they got there or is this lubrication

system not been changed for a long time, which there will be a lot more anomalous surface characteristics on there. So taking ten samples is virtually worthless, it's not an appropriate sample to characterize the entire production line.

Q So are you saying that in the circumstance of lubrication, if it is not properly lubricated, there's a difference in whether or not there will be subclass or -- more or less subclass features?

A Absolutely. In fact, there are typically three regimes of lubrication: Boundary layer, fluid film and (indiscernible) --

COURT REPORTER: I'm sorry?

THE WITNESS: Boundary layer, fluid film and elastohydrodynamic lubrication. And those can occur on a microenvironmental scale all at the same time in various parts along the same sample, even in production. So taking ten guns is no sample at all. It's not an appropriate statistical sample, so as a plant metallurgist, I could stand there right by production and still not be able to characterize whether certain characteristics are supposedly individual or whether there's a subclass belonging to the manufacturing run.

BY MR. ROSE:

Q And that's because of these issues, including whether or not things are properly lubricated?

A That's correct. And maybe to take a very understandable example, let's just say there's a chip or a piece of grit of silicon carbide, which is a grit of sand. So let's say a grit gets in the drawing operation, it's going to drag on the surface and it's probably going to rotate a bit. It's going to degrade essentially and then be degraded away, and production resorts back to the way it was.

The problem is, let's say you come in and you take ten samples, how does an experimenter know that those ten samples weren't -- exactly when those anomalies were happening, but once they leave the plant, that grit is gone. It's now going back to the same as it was doing to the other thousand weapons.

Q All right. Let's talk about the premises of uniqueness and repeatability and what is their importance?

A I think we already discussed this. Basically, uniqueness exists, which is a required -- if one is going to opine that an object originated from this specific source, the sudden implication is, therefore, this specific source must be unique. It has to be. That is a required premise.

In other words, if there were ten or 20 or a thousand other sources, how can you say it came from this

source to any of others. So the implied premise for firearms toolmarks identification is one of uniqueness. But again, scientists challenge whether that's even relevant for the probative or a judicial proceeding.

The key issue is whether a human observer can discern that a uniqueness exists, so that's the -- that's the issue.

Q Let's skip ahead.

A And that's why we changed the challenge to -- we don't challenge whether uniqueness exists, but scientific challenges to whether discernable uniqueness exists for firearms to be able to apply their trade.

MR. CLARY: Your Honor, is it possible for me to have a bathroom break at this point?

JURY PANEL: Yeah, please.

THE COURT: Ladies and gentlemen, we're going to take a break. Be back in ten minutes.

COURT DEPUTY: Jury existing.

THE COURT: Please don't discuss the case among yourselves.

(The jury exited the courtroom.)

(The Court took a recess.)

THE COURT: Let's go on the record, please.

His next slide is going to be firearms identification is not a science?

MR. CLARY: Your Honor, I would object to that. He's not qualified.

THE COURT: Really?

MR. CLARY: I would object to that slide, yes, Your Honor.

THE COURT: And why?

MR. CLARY: Because firearms identification, he's not qualified to make that determination. He's not a firearms examiner. He's not qualified in identification -- he's making a broad generalization based on his own personal belief and not a wider scientific community.

MR. ROSE: That's not at all what he's doing.

He is applying the scientific method to what the A.F.T.E. does. The A.F.T.E. is not scientific, by definition, because it is entirely subjective. It is 100 percent subjective and it depends entirely, entirely as she testified, on the examiner's training and experience. Science is objective. Toolmarks is 100 percent subjective. It is, by definition, not science if it is 100 percent subjective.

THE COURT: Well, first of all, I didn't hear her say it was a hundred percent subjective. I thought she said she had criteria that she had to follow. She's standing right back there and we can put her back on.

MR. ROSE: That's fine. The criteria that she has to follow says it's subjective. It says it in it.

MR. CLARY: Again, his specific field of expertise is metallurgy and a science related to metallurgy, and he's claiming basically expertise in the field of --

MR. ROSE: He's not -- no, no. He's not claiming any expertise in firearms and toolmark identification. That's not the point. You will never find --

THE COURT: He is claiming expertise in being a scientist.

THE WITNESS: Yes.

THE COURT: The question is, how do you define science?

MR. ROSE: Well, he's done that. And he said why the A.F.T.E. is not scientific.

THE COURT: Well, that organization may not be scientific, but what she does may be scientific.

MR. ROSE: It's 100 percent subjective.

THE COURT: All right. Bring her up here, please.

Ms. Murphy, come up here. Stay right where you are.

MS. MURPHY: Uh-huh.

THE COURT: You're still under oath, ma'am.

Is what you do 100 percent subjective?

MS. MURPHY: No, it is not. No.

THE COURT: That's the problem I've got, Mr. Rose. It's not 100 percent subjective.

MR. ROSE: The theory of identification even says it is. It is dependent upon -- subjective and dependent upon their training and experience. That's what it says.

MS. MURPHY: The determination of a significance is what is subjective. In every science, every single science has subjectivity. When a doctor examines you and determines that you have a head cold, that's a subjective decision on his part, based on his experience and his training.

When a chemist sets a baseline on an instrument, that's a subjective decision based on their intuition, their experience and their training. Every science has subjectivity attached to it. There is more to the subjectivity of firearms and toolmark examiners as far as their conclusions are evolved. It's how they arrive at that conclusion.

There is a methodology to get to that end point and that is not subjective.

MR. ROSE: There are no guidelines. There is nothing -- there's absolutely nothing. It is that you're supposed to remember what you've seen and compare it to what you've seen. It is completely

subjective. I think her testimony is -- what is objective is what she is looking at and not what she thinks and not her method for arriving at it.

THE COURT: Do you have any response for that, ma'am?

MS. MURPHY: Well, yes.

THE COURT: Go ahead.

MS. MURPHY: There is protocol for how we do an examination. There is protocol listed in the AFTE theory of identification. It's just you're not understanding how it's written and you don't do the work, so you don't understand exactly what it means. But the AFTE theory of identification is basically, it enables you to take two toolmarks and be able to relate them as having a common origin.

MR. ROSE: Correct. I understand.

MS. MURPHY: Once you get passed that, then you have to, based on your training and experience, you're looking at marks under the microscope. And you're comparing those marks together. And it's not just a matter of a series of lines and remembering all the series of lines that I've seen. That's not it at all. You're matching up patterns together.

MR. ROSE: It's still subjective.

MS. MURPHY: No, it's not subjective.

What you see is what you get, that's what's there. The problem is, I can't bring a microscopic into a courtroom every time I have to testify, put the evidence on the microscope and show it to the jury. They would have to each personally come up and look in the microscope. And since they're not trained to know what they're looking at, it would be pointless anyway. But the evidence is on the microscope, under the microscope, on the evidence itself. It's not in a photograph.

A photograph is just a representation of a certain little area that I happen to look at. It doesn't cover everything on that whole surface that I'm looking at to make my identification. It's just part of my notes that represent where I took my identification at; where I found it and what I was looking at.

I also verbally describe what I'm doing and what I'm seeing in my notes. So it's not -- it's not totally, 100 percent subjective.

THE COURT: And here's the other thing I don't understand. Where it says no reproducibility, she fires additional shells out of the same gun and reproduces. Now, I understand she may not produce all these sub-identifiers, but she's reproducing an identifying mark from that particular firearm. And I

made it clear to the jury that that firearm is not excluded -- or that that firearm is not 100 percent excluded -- or excludes every other firearm in the world.

So while, certainly whatever she does isn't 100 percent perfect, I'm not comfortable -- and I agree with Mr. Clary on this -- I'm not comfortable with him saying firearms identification is not a science.

What I will allow him to say is that in his opinion --

MR. ROSE: Right.

THE COURT: -- I don't want him saying just blatantly it's not a science. I mean, everybody has an opinion, just like everybody's got other things. You know what I'm saying?

Okay. So in his opinion, he can say that firearms identification is not a science, in his opinion, and he can say why. And then, if she wants to get back on and testify, that will be fine, and restate to the jury why that's not true or why it is true, or whatever she wants to say. Or if Mr. Clary chooses to put her back on.

But, you know, as an expert, he can render an opinion. It's his opinion. But he also -- the other thing he needs to stop doing is quit rendering opinions

of the entire scientific community, because the opinions he's supposed to be rendering are his opinions, and are not correct. It's his opinion, not what the entire scientific community -- because I guarantee you that I can find a scientist somewhere that's going to disagree with him, somewhere in the world.

THE WITNESS: Your Honor, I should be allowed to collaborate, which I do, and I'm on public record --

THE COURT: No, no, you can collaborate --

THE WITNESS: -- with affidavits indicating that it's a unanimous consensus amongst all of the professors with whom -- and scientists -- it's unanimous that firearms toolmarks is not a science. It does not --

THE COURT: Don't interrupt.

THE WITNESS: -- it does not exhibit the hallmarks for reasons we haven't talked about yet, but it does not exhibit any of the hallmarks of the true science, the scientific endeavor.

THE COURT: I understand that. But as she can't say that that firearm is the only firearm in the whole world that could have made those marks, that's what Mr. Rose wanted me to instruct that she couldn't say. You can't say that every scientist in the whole world

is going to agree with you.

THE WITNESS: Nor do I.

THE COURT: Right.

THE WITNESS: I don't say that.

THE COURT: And to say that the scientific community -- if you want to limit it to the scientific community that you have discussed it with, that's one thing.

THE WITNESS: Well, the literature --

THE COURT: And the literature that you've read, yes.

THE WITNESS: And that's all I'm representing.

THE COURT: But the way it's coming out is the scientific community doesn't accept this and that's the entire scientific community. You know, I want to give this jury a true picture of what's going on here, one way or another. I don't care how it comes out. I just want it to be accurate, okay?

MR. ROSE: Sure.

THE COURT: Let's try and get this back on track. If he wants to say, in his opinion, he can say that. And she can say whatever she wants to say, when she retakes the witness stand, if she retakes the witness stand. But let's limit it to -- instead of the scientific community this or that, because you haven't

talked to everybody in the scientific community.

THE WITNESS: No, that's a -- that's inadvertent. I assumed that everybody knew that it would have to be relying upon the studies I've reviewed and my colleagues --

THE COURT: Remember what I said earlier? You're dealing with people over here whose qualifications to be on this jury is, they don't have a felony, they're 18 years old and they live in Florida, and they have a driver's license. That's their qualifications to be here. Some of them don't -- may not even have a high school degree.

THE WITNESS: It might save the Court a lot of time if we were to, right now, jump to the bottom line. Neither I, nor my colleagues, object to an opinion that the characteristics that Ms. Murphy examined, are consistent with it having been fired with that firearm. We don't have any problem with that statement.

THE COURT: All right. Then let's -- you know -- you know, as I've told you before, it's your case, Mr. Rose. You can keep going. These people are glazing over in here. They really are. I'm watching their eyes.

MR. ROSE: I don't totally agree with you.

THE COURT: You may not think so, but I'm watching

them.

MR. ROSE: I'm watching, too.

THE COURT: And you need to -- we need to get to the bottom line of what his opinion is about toolmark identification.

MR. ROSE: Right.

THE COURT: He doesn't believe -- what's the word?

MR. ROSE: Metallurgy.

THE COURT: Easy for you to say it. Yeah, right.

THE WITNESS: Metallurgy.

THE COURT: Metallurgy, because of metallurgy, it is not a valid scientific identification. I mean, he can say that, but that is -- that's what he's qualified to say; do you agree, Mr. Clary?

MR. CLARY: If he's stating because -- in his expertise --

THE COURT: As a metallurgist.

MR. CLARY: -- and what's the other one?

THE WITNESS: Material science.

But I would help you out. I wouldn't even be that strong. I'm not saying it's not a valid -- I'm not offering the testimony to rebut the truth of the matter asserted that it's a claimed match. I'm not disagreeing with that. What I am taking objection to, scientifically, I'm saying nothing different than the

National Academy of Science hasn't already said. The examiner cannot opine to any degree of certainty. It's -- we'll agree that it's consistent -- "we" being my colleagues and I -- that the examiner can opine that the characteristics she saw are consistent with it having been cycled or fired from this firing platform or this weapon.

THE COURT: Well, the Florida Supreme Court has ruled in January of this year that firearms identification is of -- such has been accepted in the -- I don't have the case in front of me.

MR. CLARY: It's *King versus State* --

THE COURT: Yeah, and --

COURT REPORTER: I'm sorry, it's who?

THE COURT: It's been accepted --

MR. CLARY: *King versus State of Florida.*

THE COURT: Here's what the Florida Supreme Court said in January of this year. Let me find the language.

MR. ROSE: They said because it's been accepted for a hundred years that you don't have to do a *Frye* hearing.

THE COURT: Yeah, because -- hold on, I want to find the exact wording, so that we all understand. It's such a long opinion. I've got to find the right

page.

They said, additionally, standards controlling firearms comparison testing exists as being testified on the State Court versus Doberd (ph) hearing, he filed a well-accepted method in scientific procedures and in making this comparison, and they went on to say that -- basically, that you don't have to do a *Frye* hearing because fire mark identification evidence has been clearly accepted for over a hundred years in the court. And *Frye*, if the Supreme Court of Florida thought that it was -- that the use of firearm mark identification evidence was unacceptable, they -- this case just came out in February of '12, they would have certainly said so.

They said, we don't need a *Frye* hearing to establish its acceptance of the scientific community, because it has been accepted on so many times and they said they have nothing to show that it's not accepted. There were a few federal cases cited and those federal cases, they said, are not persuasive.

So the bottom line is, is the Florida Supreme Court has said I didn't need a *Frye* hearing, which says to me that it's accepted in the scientific community. And, therefore, for you to say that firearms identification is not a science. You can say, in your

opinion, but you can't just make that bold statement; do you follow me?

THE WITNESS: Yes, Your Honor.

The same claim was made with comparative bullet-lead analysis, as well, for almost four decades. But when they're saying "community," I don't believe the Court had standing to claim what the true scientific community's position was. It had been admitted for a hundred years and there are numerous papers indicating that the courtroom is not a laboratory, but the comparative bullet-lead analysis, that parallels pretty much the same challenge as what's happening now.

MR. ROSE: He'll restrict his testimony to his opinion.

THE COURT: You know, you may disagree with the Supreme Court and I may disagree with the Supreme Court. I'm not saying that I do. But on numerous occasions I have disagreed with what the Supreme Court has said, but I have to follow what they say. You know, they're a much higher court than I am and when they mandate a ruling, I'm bound by it. And they have said that, obviously, I'm really having a hard time finding the language, but at the very end of that issue -- I don't have my case on it here,

unfortunately, but I had it marked -- do you have another copy of this case?

MR. CLARY: Do I have another one? Yeah, I have one with --

THE COURT: Do you have it where that language is marked?

MR. CLARY: I don't have it where it's marked, but I'm trying to find what you're talking about.

THE COURT: Where they said no *Frye* hearing was required?

MR. CLARY: I have where that is. I have that marked. Here's where it says no *Frye* hearing is required.

THE COURT: Yeah, here's what they said:

We have reviewed the history of tool-mark comparison, and we conclude that the trial court did not err when it declined to conduct a *Frye* hearing. Decisional law demonstrates that toolmark identification in the context of ballistics has been used in the criminal context since at least 1929, and in Florida since at least 1937.

Although *King* contends that toolmark identification in the absence of a known weapon should be subject to a *Frye* inquiry, research reveals that both Florida courts and other state and federal courts

have admitted this evidence since at least 1969.

They went on to say that, in light of this well-documented history of toolmark identification over the last century, we conclude that this procedure is not new or novel and, therefore, the trial court properly declined to conduct a *Frye* hearing. And *Frye* is certainly for new and novel concepts that the scientific community may or may not accept. You know what *Frye* is.

THE WITNESS: Yes, Your Honor.

THE COURT: So by them saying that, I have to -- I can do nothing but deduce that they're accepting this as a proper scientific method of identification.

THE WITNESS: I have a slightly different reading.

THE COURT: All right. And that's your privilege.

THE WITNESS: My reading of *King* was that --

MR. ROSE: He's limiting your testimony to this point. It doesn't matter.

THE COURT: I want -- you can say firearms identification, in my opinion, is not a science. But I don't want you to say in the scientific community it's not an acceptable science, because that's just not a true statement. It may be in the scientific community that you've talked to or read --

THE WITNESS: Well, of course.

THE COURT: But you can't say the entire scientific community does not accept it. Because it's been accepted in Florida since 1937.

THE WITNESS: Well, the implication, when I say the scientific community, I was just assuming everyone would realize that, obviously, it has to be from the sampling that I've made with my colleague and the literature --

THE COURT: I understand something about jurors, they don't -- they don't deduce anything from what you said to relate just to you. They take your words at face value, one way or another, okay.

Are we ready to get started again?

MR. ROSE: Yes.

THE COURT: All right. Let's get them going, please. Let's bring the jury in, please.

MR. ROSE: Judge, I'm just going to cover the slides that this is not a science.

THE COURT: All right. Have a seat.

MR. ROSE: Let's go to the next one.

(The jury entered the courtroom.)

THE COURT: All right. You can go ahead.

MR. ROSE: Thank you, Your Honor.

I think she needs that adjusted.

THE COURT: Go ahead.

BY MR. ROSE:

Q All right. Mr. Tobin, in your opinion as a forensic metallurgist and materials scientist, and that opinion of other scientists in your field, is firearms and toolmark identification science?

A No.

Q Why not?

A It lacks the hallmarks of a true science, for a number of reasons.

Q What are those reasons?

A Again, subjectivity is -- training and experience is unacceptable as proof in the scientific community. There are no parameters of detection designated in any kind of a protocol, a scientifically acceptable protocol. And then there are no rates of application of any parameters of detection.

And what the decimally I would use is, we're baking a cake. In other words, there has to be a protocol that tells you what you're looking for and then how you're supposed to judge what you're looking for. And part of the reason for that is, it two of the hallmarks of scientific endeavors are repeatability and reproducibility, and those do not -- in the true scientific arena are not the way they're used in the firearms toolmark. They have a slightly different meaning. But let's say we're baking a cake. To

bake a cake, the rates of -- I'm sorry -- the parameters of detection would be equivalent to saying what ingredients are you going to be putting in this cake? What specific ingredients are you going to be using to make this cake?

The lack of guidance on how to -- on how to apply those, would be -- and what amounts are you going to put in each of these ingredients and how do you plan to mix them? How are you going to cook it?

So the bottom line of firearms and toolmarks practice has no parameters of detections specified, i.e. ingredients, let's say. It has no application guidance for how to apply any rates of parameters and detection. And then it lacks repeatability and reproducibility.

Repeatability is the property of an experiment where the same examiner can repeatedly repeat the results of his or her experiments over and over, that's repeatability.

Reproducibility is for external, another examiner or in the scientific arena, another scientist to be able to reproduce the experiment of someone else, that's reproducibility. And there's ample evidence of terrible misattributions having been rendered. In fact, in one case we may or may not see here, the same examiner, a year later, decided he found another gun that he liked even better than the one he originally said he was a hundred percent certain that it came from. So that addresses the issue of

reproducibility -- I'm sorry -- repeatability. There's a case where the same examiner, a year or so later said, no, I like this one better than the one I saw last year.

Q Okay. Let's talk about the claim of the zero to one rate of error in the firearm and toolmark community.

A Yes.

Q What is your opinion about the accuracy of that statement?

A My opinion is that it is without foundation.

Q Why?

A There is ample evidence in the literature of significant misattributions or rates of error, including some involving police officers who were charged with murder and later found to be totally innocent of what -- and I have an example of those, if we get to those. So there are significant rates of error in known testing processes that rate -- that range from -- I think I have a slide here -- from 2.3 percent to 28 percent, and those are minimum. In other words, there's a reason -- those are the minimum rates of error in some of these testings.

Q What are these testings that you're referring to?

A These are various tests, collaborative testing services. Some of it was an L.E.A.A. funded. That's Law Enforcement Administration [sic] something or other. They conducted testing back in the 70s or 80s, where they would

test examiners, and so the rates of error were reported in the literature as anywhere from 2.3 percent to 28.2 percent. But again, I point out, those are minimum. And the reason for that is, most of these tests allow for inconclusives.

Q What does that mean?

A That means an examiner is allowed to say, you know what? I'm not really sure. So the rule is --

Q How does that affect the accuracy of these?

A It affects them because -- what other studies have shown is, when examiners don't know they're being tested and they're doing actual casework, the rates of miss -- I'm sorry, inconclusive ranges from four to seven percent. But when they knew they were being tested, inconclusive skyrocketed to 40 percent. In these testings, they don't even count the inconclusive; most of them don't.

Q Okay. Are there any notable misattributions? You've already talked about some.

A Yes. There's a case, the first one was found -- and most of these misattributions are found fortuitously or accidentally, so that's the problem with the feedback loop. Examiners will go out and testify in court to a match and then go back and conduct casework. They never find out -- there's no way of communicating when they have made an error, an error or a misattribution or a misidentification, other than by accident. That's the general source of these

misattributions.

Q Why doesn't the fact that someone checks, essentially and confirms -- checks their work afterwards, why does that not account for this error that you're talking about?

A That process is ripe with various cognitive biases, confirmation bias, expectation bias, and some cases contextual bias. But the problem is, even in those verification processes, they still don't have access to ground truth.

Q Ground truth, again, is what?

A Did this cartridge case, in fact, come from this weapon. So the second examiner, all they're doing is using the same subjective method and looking at the evidence and saying, yep, I agree with you. I would call this as well.

The key issue in these exams, by the way, they don't consider what are known scientifically as Type III errors, and one study dramatized that. Type III errors, when you get the right answer but for the wrong reason. In other words, you're getting the right answer, but to the wrong question, basically. So for example, one or several of these studies, they would be, let's just say, ten -- and I will pick a number now -- 20 examiners saying, yep, I agree, this is an identification. So when they went to each of those examiners and said, which of these lines are you counting to

call it an identification and there was significant disagreement as to which lines constitute a match.

In one case, up to 39 different lines, examiners disagreed on. They all agreed it was a match or a claimed match, but they disagreed on which characteristics were a match. That's a Type III error.

Q What other notable misattributions are you aware of?

A Well, there's another one that's particularly -- a police officer was shot and killed, and it was originally believed that he was killed with his own weapon. The weapon was not recovered for quite a long time. A short period of time afterwards, I don't know if it was months or I guess maybe a year later, a suspect was developed. They seized a weapon. They examined the weapon and the examiner who was a 19-year-veteran, who trained other firearms examiners, concluded that the suspect's weapon is the one that fired the weapon.

At some subsequent time of the trial, the officer's weapon was, in fact, recovered and that same examiner was sent that weapon, and that same examiner then concluded, I like this match better than the original one I did. So his original testimony was totally in error.

Q And --

A Well, I'm sorry, one of the two testimonies was in

error, which comprises of a 50 percent error rate.

Q What about the *Trotter* case?

A I think that was *Trotter* that I just mentioned. *Trotter*, yes. I'm sorry, that's *Trotter* I was discussing.

Q What about *Williams versus Cortamen* (ph)?

A That's a case where a firearms examiner testified that the caliber -- that a bullet was fired from a specific .25 caliber pistol, but later was found to have been fired from a .22 caliber pistol instead of a .25 caliber. So that is actually a class characterization -- a class characteristic error an error in describing class characteristics.

Q Okay. Class characteristics meaning the larger and the broadest characteristics?

A Yes.

Q The field, so-to-speak?

A Yes.

Q All right. What is the National Academy of Sciences?

A That is probably the nation's most prestigious scientific assimilative and distinguished scientists together, to render guidance and advice to the government. It was formed in the 1800s I believe, to be scientific advisers to congress.

Q And do you have any contact or have you had --

done anything in common with the National Academy of Science?

A Yes.

Q What is that?

A I participated in the 2004 National Academy of Sciences committee studies and then --

Q What committee study were those?

A Comparative bullet-lead analysis.

Q Okay.

A Then I have colleagues who were on the 2008 ballistic imaging committee. And my coauthor --

MR. CLARY: Your Honor, I'm going to object. His colleagues were on it, it doesn't mean he participated, Your Honor.

THE COURT: Sustained.

THE WITNESS: Well, I collaborated with them on a weekly or a monthly basis on these issues, so. . .

THE COURT: All right.

MR. ROSE: That's fine. Just go on?

THE COURT: Yeah.

BY MR. ROSE:

Q Okay. So you -- with respect to the National Academy of Sciences, has the National Academy of Sciences recently asked -- been asked by congress to opine and give guidance on the state of forensic sciences in the United

States?

A They have, yes.

Q And was that in 2009 when the report was done?

A The way you phrased the question, yes, that's correct.

Q Okay. Now, the 2009 report, what was the National Academy of Science's opinion on the state of firearms and toolmarks examination?

A Firearms and toolmarks examination in that study was included in the sciences that they concluded, has not been shown to have the capacity to consistently and reliably demonstrate, with a high degree of certainty, demonstrate any connection between evidence and a specific individual -- I'm sorry -- individual or source, rather.

Q Did they -- did the National Academy of Science's have problems with forensic sciences pretty much across the board?

A In that study, they did, yes.

In the 2008 study, they were more specific on the firearms -- in the firearms.

Q What's the only study or forensic discipline that they didn't call into question in 2009?

A That would be DNA.

Q Okay.

A And I would point out that that's a perfect

example of what I was testifying earlier about. A proper way to perform empirical inductive experiments, where you can't sample the whole population, but what you have to have is an expression of scientific -- scientifically found expression of certainty to characterize the uncertainty in your investigation.

For example, the way DNA does it, it is they'll typically testify to a 98.3 percent certainty. This is my opinion. They will never, ever say that it came -- that this came from this person or source to the exclusion of all others. And they won't even use the terms reasonable any kind of scientific certainty, because it has to have a properly scientifically founded expression of certainty, which they do 98.7 percent or 99 percent.

Q All right. And what does the -- what do they say about the idea of matching?

A They basically say that the state of the art is such that it's never been established that -- within any reliability that such matches can be made. It's scientifically unfounded.

Q Okay. How do they -- how do they describe that?

A Well, individualization or specific source attribution. They call the expressions -- here's -- when one opines that a certain item came from a specific source to the -- they may not say to the exclusion, but when you

opine that it comes from a specific source, probability ranges from zero to one. Zero means that it's an impossibility. One means that it's a dead certainty, an absolute certainty. So certainty, for example, a .31, would be a 31 percent chance of something happening. An examiner opining that this came from this, is an implicit extreme probability, a statement basically saying that it's a hundred percent certainty. In the scientific arena, making an individualization implies, what N.A.S. has said, the extreme probability statement that has no foundation.

Q And what has -- what have they said about any sort of statistical basis that can be drawn?

A They basically say that such opinions imply the presence of some kind of a statistical basis that would give it validity, but in fact, they pointed out that there is no such basis.

Q So in the end, what is -- what is the N.A.S.'s opinion of -- at least in 2009 -- of the science of firearms and toolmark identification?

A They're basically saying that it's an unfounded practice that there's no scientific foundation for it. The way that it's practiced, and rendered in court or proffered in courts.

Q Do they offer any -- any advice for the field or things that they could change in order to fix these

problems?

A Yes.

Q What were those?

A Well, they recommend that proper research be conducted to perform the necessary scientific support for the opinions that have been rendered for a hundred, plus years or something.

Q Have any of those studies been done, to your knowledge?

A No.

Q Now, in your opinion -- Mr. Tobin, in your opinion, what is the true scientific statement that a firearms identify -- firearms and toolmark examiner could make with respect to how -- whether or not something -- a projectile or a shell casing came from a firearm?

A The strongest scientifically defensible opinion would be, in my opinion, and that of those with whom I collaborate, is that, quote, based on the characteristics that I observed, "I" being the examiner -- and that's the first caveat -- this is an opinion. Based on the characteristics that I observed, it's my opinion that the characteristics are consistent with the shell casing in this case, having been cycled through or fired through this particular firearm, consistent with --

Q Okay. So would it be fair to state then that

you're not saying that firearms and toolmark identification is absolute garbage, correct?

A No.

Q What applications does it have that are acceptable?

A Well, I'm on public record as indicating that it's far from a junk practice -- a forensic practice. In fact, to this day, I still find it to be, in my opinion, the third most effective forensic practice for investigative purposes and can have probative value if proper -- if scientific research is conducted.

Q But has that scientific research been conducted?

A No.

Q Okay. So when you say "if it has probative value," what does that mean?

MR. CLARY: Is that in his opinion, Your Honor?

THE COURT: Are you objecting?

MR. CLARY: I'm objecting, yes.

THE COURT: Okay. In his -- it's his opinion?

MR. ROSE: At this point, yes, absolutely.

THE WITNESS: Yeah, I thought I already included that, in my opinion, that is the strongest -- I'm sorry, the issue was? Oh, in my opinion, firearms and toolmarks is still an effective investigative tool and can have some probative value by indicating consistency

with a suspect weapon.

MR. ROSE: Okay. Nothing further.

THE COURT: Okay. Cross examination.

CROSS-EXAMINATION

BY MR. CLARY:

Q Are you aware of any court in the Union that does not allow firearms analysis and comparison as a valid scientific theory?

A Yes.

Q Which court would that be?

A There are a number of them. I don't have the exact number before me, but there are a number of them that have rejected and disallowed it. I can indicate *U.S. v. Alls*, A-L-L-S. That is the Southern District of Ohio, Eastern Division. There was a federal case, *U.S. v. St. Gerard*, Judge -- the Honorable Nancy Gertner has also limited the expressions of opinion. And there's Alls, there's Green, Montero, and there are a number of cases that have either limited or excluded.

Q Limited?

A Limited, yes, sure.

Q How many have excluded it, altogether, from being introduced into evidence? And give me the specific cases.

A Well, that I don't -- I don't memorize these things.

MR. ROSE: Judge, I'm going to object to the relevance of this line of questioning pertaining to excluding it from evidence, because it hasn't been excluded from evidence. And he hasn't said --

THE COURT: I'm going to overrule the objection. Go ahead.

BY MR. CLARY:

Q What specific case has stated that it has been excluded from being allowed into evidence?

A Would that be all toolmarks and firearms?

Q I'm talking about the firearms analysis, in what --

A I'm sorry, but I would have to review the case law on that. I don't have them before me here.

Q Now, you testified earlier that -- that during the comparative bullet-lead analysis -- is that what it's called?

A Yes, sir.

Q That you did statistically analyze that; is that correct?

A Sure, yes.

Q Now, did you do that -- was that paper done with Dr. Spiegelman and Dr. Kafadar?

A Kafadar.

Q Kafadar.

A Oh, I'm sorry, I'm just saying -- Kafadar is the pronunciation. What's the question?

Q Did you -- your work with that, was that with those two doctors; is that right?

A I worked with them, but not -- the three of us haven't jointly published a paper, no.

Q But your work in comparative lead-bullet analysis study, it was with them, correct?

A Yes. Separate, I mean.

Q And they did the statistical analysis --

MR. ROSE: Objection. He needs to let the witness answer the question.

THE COURT: Sustained.

THE WITNESS: Sure. I will save you time.

They are professional statisticians. Dr. Spiegelman and I -- he's a distinguished professor of statistics at Texas A&M -- he and I coauthored several papers. He was also a coauthor when we won the J.F.K. Assassination research and he did the statistics exclusively for that particular paper.

But your question earlier was, did I do comparative bullet-lead analysis statistics. Yes, in our original study I did some. But don't forget, there's two studies with C.B.L.A, so depending on which one you're referring to.

BY MR. CLARY:

Q Wait a second.

Are you aware that the National Academy of Science has recognized firearms analysis as a science?

A No, I'm not.

Q Okay. Are you aware that the American Society of Crime Lab Directors and the Laboratory Accreditation Board recognizes firearms analysis as a science?

A Well, that -- the ASCLD is generally not staffed with scientists, anyway, but you can call it what you want to. It doesn't matter what they're calling it.

Q And the National Academy of Science, you said that's the national science -- the scientists all get together and they compose that; is that right? You testified to that.

A Well, not all scientists. They're hand-selected, distinguished scientists who are forming the committees, yes.

MR. CLARY: One second, Your Honor.

BY MR. CLARY:

Q Would it be fair to say that you actually have limited statistical expertise?

A Sure.

Q And you stated that you were talking about DNA, because DNA analysis, you have fixed points of references

and 13 alleles, right?

A Sure. I mean, I'll accept your characterization. I'm not a DNA --

Q Statistically, you can extrapolate out based on genoa population statistics of DNA chemists and biologists, understood about the nature and the makeup of DNA, and because those points are always fixed, it's easy to make statistical judgments from a small random population. Under the circumstances, it's a straightforward methodology, right?

A You're already over my paygrade. I don't do DNA. I just treat DNA as an example of empirical inductive experimentation.

Q But you're aware that when they make DNA matches if it's a very strong match, it's usually one in 34.4 quadrillion, right?

A Sure, yes.

Q And while they don't say, to the exclusion of every person that possibly could exist in the world, they do put it in terms of the world population, right?

A Yes.

Q And world population being approximately seven billion people or give or take, you know, 20 or 30 thousand here or there. That would indicate there's a high probability that that was a match, right?

A Yes.

Q Okay. And basically what they're doing is they're randomly sampling a small section of human genoa, right?

MR. ROSE: I'm going to object. They're crossing him about DNA and DNA has nothing to do with this. He didn't testify to anything to do with DNA except it was the only thing that DNA did not -- all he said about DNA.

THE COURT: He opened the DNA door. Go ahead. Overrule your objection.

BY MR. CLARY:

Q Now, the way you conduct a study is to randomly sample a small portion or they sample a small portion of a DNA strand, which is a large strand, right?

A Yes.

Q And they select -- they select certain spots that have individual characteristics and vary between the majority of the population; is that right?

A I will accept your characterization. But you're now in an area that I'm just not familiar with the experimental methodology.

Q And the way scientists get around not testing or comparing the entire genoa is they extrapolate out from the those matches; is that right?

A I'm sorry. Say that again.

Q They extrapolate out from those, the number of alleles that match?

A Well, within a -- I'm sorry.

Q Go ahead.

A With an appropriate expression of variability of certainty. To use an analogy from my world, I'm going to have to presume that whatever the alleles that they have selected. One example I've used is, let's say we can test every element in the Periodic Table, I don't know how many there are, 103 now or whatever.

Let's say that we go test 13 or whatever number you're saying for a certain metal and this is part of the problem with bullet lead, and you're drawing conclusions from these seven elements, where is the basis by which the selection of those seven elements is relevant? You can test -- let's say all 103 elements in the Periodic Table and say that these bullets -- or let's say you test 97 of them. Let's say that these bullets are consistent with each other in all 97 elements. Well, that's a very misleading statement to a juror, or even to the scientific community because, as it turns out, those 97 are not even expected to be present. They're not -- they are neither present nor expected to be present.

So what's critical -- and you're taking me astray now, because I don't know how those alleles were selected.

Presumably on a scientific basis, but I'm accepting your characterization.

Q And when they run the -- what they do with DNA, and those alleles stop at the specific places, based on the weight of the substance?

A Yes.

Q Doesn't a person subjectively analyze that result?

A Undoubtedly, sure. Again, you're --

Q So to all science, there is a subjective nature, right?

A What you're missing is, up to presenting the very data that is to be interpreted, there is a very rigid protocol with parameters of detection and rules of application of those parameters that are not present in firearm toolmarks.

Q You are not aware and have not gone through training in firearms analysis and comparison, right?

A That is correct.

Q And you're not aware of all the procedures and steps that are involved in what they're looking for, as far as matching and striations and everything else?

A That's not correct, because I did that for 24 years. Keep in mind, firearms toolmarks is a much easier subset of toolmarks -- did I just say that correctly -- firearms identification is a subset of toolmarks and it's

from a physics and material science standpoint, it's a much easier practice than toolmarks is. So that's not correct.

Q Okay.

A There's physics reasons for that, by the way.

Q The A.F.T.E. has --

A AFTE?

Q A.F.T.E. has procedures in place, right; are you aware of that?

A Well, it depends. There are procedures, but they're not scientific procedures, I mean.

Q In your opinion, they're not scientific procedures?

A The procedures would be -- in my cake baking analysis or example to say, go to the kitchen, open the refrigerator or closet, grab some ingredients and make a cake. Those are not specifying any parameters of detection. They're not specifying any rules of application to discern same or uniqueness. So the bottom line is, the AFTE guidelines or rules basically say -- or even State lab protocols basically say, all right, take this bullet, clean it up, weigh it, take whatever metrological metrology exams you want to conduct on it, measuring exams, sorry. And then proceed to put it under the scope and then put a closely similar lighting, as you possibly can, and look through the microscope and then you adjust the samples and you try to

align and there are procedures for indexing the round or the cartridge -- actually rounds.

So there are general procedures, but they still do not have the specific procedures required by the proper scientific method.

Q In your opinion?

A In my opinion, and that of my colleagues. And the National Academy of Sciences.

Q Now, you stated that when there -- you listed off a bunch of error rates and these are all for cases going back from 1995 and back; is that right? The error rates you listed 2.3 percent, 3.8 percent, 5.7 percent --

COURT REPORTER: I'm sorry, 5.7 --

MR. CLARY: I will slow down.

BY MR. CLARY:

Q It is 5.7 percent, 3 to 8 percent, 8.8 percent, 9.1 percent, 10 percent, 12 percent, 24 percent, 28 percent, 28.2 percent; is that right?

A I will accept your characterization. I don't have the slide in front of me, but I will accept that.

Q Also done prior to 1995?

A If that's what you have there, I'll accept that.

Q It's what you put up on the display?

A Sure. Help me find it here.

Q It's firearm and toolmarks rates and errors.

MR. ROSE: Judge, may I give him this to be on the same page?

THE COURT: Yes.

THE WITNESS: I'm getting there. No, I don't actually -- why don't I just use yours? I have it, sorry. I'm sorry. Go ahead.

BY MR. CLARY:

Q Is that correct?

A Well, actually, I don't have dates on some of them, so I would say the majority of those look to be between the periods that you're talking about.

Q Okay. And that would be prior to the N.A.S. report, correct?

A Sure, yes.

Q And are you aware of the policies and procedures of the Florida Department of Law Enforcement, regarding firearms analysis?

A Aware of them, no. But I'm aware of most -- many jurisdictions are pretty similar.

Q Okay.

A In other words, not specifically, no.

Q You stated when you were testifying that when firearms examiners knew that they were being monitored or checked, or at regular intervals, their work was being looked over by another individual, that they -- the error

rates dropped down to, I think you said 2.3 percent; is that right?

A Actually, you stated the opposite. But no, what I was referring to is blind tests versus a double blind test. Blind test is when the respondent is unaware of what they're doing is a test. A double-blind is even when the administrator or the supervisor tests and doesn't even know it's a test. But what I basically was saying was, in actual casework in the studies that I was referring to, they were showing inconclusives to be somewhere at four percent, seven percent or somewhere in that range, in that single digit range.

But when they became -- when they knew that they were being tested, the rates of inconclusives -- I'm seeming to recall it's the CTS study, 5-438 or 238, but the rate of inconclusives jumped to 40-plus percent.

Q Which would mean as -- as somebody is reviewing your work, you're more careful regarding what determinations you make?

A Oh, okay, yes, if that's what you meant in reviewing the work, yes.

Q And you are not calling into question Christina Murphy's identification of these shell casings from the scene and the test-fired shell casings being consistent with being fired from that same gun?

A No.

Q Okay. All you're questioning is her use of the verbiage to a reasonable degree of ballistic certainty; is that right?

A That's correct. That's a factitious phrase that's very subjective. Reasonable means whatever an individual wants it to mean. It has no operational definition, so that's correct. Or the implication that this is the only possible source of the --

Q And you have never examined the fired cartridges in this case; is that right?

A No.

Q And you can't make any conclusions --

A I'm sorry, you asked me, is that right? Yes, that's right.

Q Yes, that's right.

So you can't make any conclusions or determinations based on never having seen those; is that right?

A Not on whether it's -- the fact of a claimed match, no, not here, not to rebut the fact of a claimed match.

Q So all you're here on is to attack the science behind firearms analysis or actually the terminology used by the firearms analyst?

A Yes. That's probably the simplest way to say it,

I guess.

MR. CLARY: No further questions.

THE COURT: Do you have anything further?

REDIRECT EXAMINATION

BY MR. ROSE:

Q Just to be utterly clear, you never saw the cartridge -- the casings and the cartridge casings, correct?

A That's correct.

Q So you wouldn't be able to say it's a match or not, you're not trained in that art, correct?

A That's correct.

MR. ROSE: Nothing further.

THE COURT: Anything further?

MR. CLARY: I actually left some things out. If the defense would allow me to ask them, beyond his --

THE COURT: Go ahead.

RECROSS EXAMINATION

BY MR. CLARY:

Q You were paid to testify here today, right?

A Paid as I am working in this case, so testifying is the least enjoyable part of it.

Q With this case, how much was your payment for the entire work you've done on this case?

A I have no concept. No idea, as I sit here.

Q How much do you get paid an hour?

A My nominal fee is $295 an hour, but I feel some allegiance to the taxpayers paying a significant part of my credentials, so it's my way of giving back to the community. I will typically comp more hours than I actually bill for.

Q But you have been here since Monday, right?

A Saturday.

MR. ROSE: Objection, relevance.

THE COURT: Overruled.

BY MR. CLARY:

Q You have been here since Monday?

A My actual rate ends up being double digits, sometimes even single digits. So yeah, I have been here since Saturday.

Q Saturday. And prior to coming here, where do you live?

A I'm sorry?

Q Where are you from?

A Virginia.

Q So you flew down from Virginia?

A Yes, sir.

Q And you -- prior to coming here, did you do any work getting ready for this trial; your testimony in this trial?

A Yes.

Q And how many hours did you spend doing that?

A I can't -- I don't have my time and billing software here, but I would guess probably several hours, a few hours. Five hours, maybe. Maybe ten, at the most. But it was probably more like five. I don't recall as I sit here that the documentation was that extensive here.

Q So basically you have been paid for your opinion?

A No. I was -- well, I was paid to give my opinion.

Q Okay. Yes.

MR. CLARY: One second, Judge. I had something else I was going to ask.

BY MR. CLARY:

Q And when you have testified in the area that you're testifying here today, have you ever testified for -- on behalf of a prosecutor or the State Attorney's Office?

A Since I've retired, yes.

Q Since you retired in this -- in firearms -- in your determination of whether or not firearms analysis is a science, and whether firearms analysis is -- or whether there's individualization in firearms analysis; have you testified about that for a prosecutor's office or State Attorney's Office? Or have all of your testimony regarding that been with the -- on the defense side?

A That's a compound question, so I would say no and yes.

Q No, you have not testified for the prosecutor's,

but yes, you have testified for defense attorneys?

A Yes.

MR. CLARY: No further questions.

THE COURT: Okay. Thank you.

Anything further?

MR. ROSE: No.

THE COURT: All right. Sir, you are excused.

Thank you very much. Go back to Virginia.

THE WITNESS: Am I released?

THE COURT: You are released from your subpoena.

Do you want to hold him over?

MR. ROSE: No.

(Volume V is concluded.)