THE CLERK: Thank you.

MR. CRAVEN: Thank you, Your Honor.

DIRECT EXAMINATION

BY MR. CRAVEN:

Q. Mr. Glover, could you please introduce yourself to the jury?

A. My name is Paul Glover.

Q. And where are you employed?

A. I'm the branch head for the Forensic Tests for Alcohol, which is a branch of the North Carolina Department of Health and Human Services.

Q. How long have you held that position?

A. I've been the branch head for just under two years. I was the assistant branch head for right at ten years before I became the branch head, so I've been there for 12 years.

Q. And can you please tell the jury what your job entails you doing?

A. As branch head I'm responsible for supervising the overall operation of our branch. I also as the research scientist for the branch am responsible for giving in-service training to our field staff. The field staff are responsible for training the officers on how to operate the breath test instrumentation. They're also responsible for maintaining the breath test instruments that we use.

We also supervise and run the Drug Recognition Expert Program. We evaluate the SBI agents who want to become blood alcohol chem. analysts and determine whether or not they get permits. And we also have a BAT Mobile Program, which is a -- are vehicles that are used at DWI checkpoints.

I supervise all of that.

Q. And you talk about the breath instruments. Are you -- does that include the Intoxilyzer 5000?

A. Yes, it does.

(State's Exhibit Number 7 is marked for identification.)

MR. CRAVEN: Okay. May I approach the witness, Judge?

THE COURT: Yes.

BY MR. CRAVEN:

Q. Mr. Glover, could you please tell the jury what that is (document tendered)?

A. It's a copy of my CV.

Q. Is that copy of your CV -- is that up to date?

A. It was printed yesterday and, yes, it is.

Q. Could you please take a look at it and see if there are anything -- if there's anything that's incorrect in that CV?

A. (Complies.)

No, there's not.

MR. CRAVEN: Your Honor, at this time I would ask that State's Exhibit 7 be moved into evidence.

THE COURT: Any objection?

MR. MCMILLAN: Yes.

THE COURT: You wish to be heard on it?

MR. MCMILLAN: No, Your Honor.

THE COURT: All right. All right. It's received over objection. Exception is noted.

(State's Exhibit Number 7 is received in evidence.)

BY MR. CRAVEN:

Q. Mr. Glover, before I sit down, do you have a copy of your CV other than this one in front of you?

A. A copy with me?

Q. Yes, sir.

A. No, I don't. I don't believe so.

No.

Q. Mr. Glover, what if any specialized degrees and training do you have?

A. I'm certified as a chemical analyst on the Intoxilyzer 5000, certified as a chemical analyst on the Intox EC/IR II. Certified to do preventive maintenance on both of those. I've been factory trained and have a training certificate for working on the Alcosensor.

I attended a course of instruction for highway safety supervisors at Indiana University. This course of instruction deals with alcohol in humans, how alcohol gets in them, what it does to them, the different methods for determining alcohol concentration in human breath and blood, and how the human body eliminates alcohol from it.

I also attended a course of instruction at Indiana University that deals with the effects of drugs on human psychomotor performance.

Q. Have you ever been qualified as an expert in breath alcohol testing?

A. Yes, I have.

Q. How many times?

A. The exact count I couldn't tell you. I've been tendered and qualified over 220 times as an expert in various fields, which have included breath alcohol testing probably greater than 50 percent of the time.

Q. And would that -- have you ever been qualified as an expert in the Intoxilyzer 5000?

A. Yes, I have.

Q. And if you know, approximately how many times have you also been qualified as an expert in the Intoxilyzer 5000?

A. Again, it would probably be greater than 50 percent of the time.

Q. And greater than 50 percent.

What was the number that you used that you've been qualified as an expert?

A. Two hundred and twenty or a few more.

Q. So approximately a hundred and ten times?

A. Yes.

Q. Have you ever, Mr. Glover, been qualified as an expert in blood alcohol physiology, pharmacology, and related research?

A. Yes, I have.

Q. And approximately how many times have you been qualified as an expert in that?

A. Probably greater than 80 or 90 percent of the time because sometimes I'm dealing with a blood case, sometimes it's a breath case, but they all deal with alcohol. The only times I would not have been qualified is that when it was a pure drug case and not an alcohol case.

Q. And specifically, Mr. Glover -- and I'll take those three one at a time. Specifically with breath alcohol testing, what -- what experience have you had with that that qualifies you as an expert?

A. Well, our responsibility is to train officers and to maintain the breath test instruments. In order to be able to do that we have to know how the instrumentation works. We have to be able to train the officers on how it

works. We have to know how alcohol gets from a person's -- from the point of consuming the alcohol to ultimately showing up on their breath. We have to know how the body eliminates the alcohol. And have to know the different methods for determining that alcohol concentration.

Q. And do you know those methods?

A. Yes, I do.

Q. Specifically, with the Intox -- Intoxilyzer 5000, the instrument used in Mr. Green's case, what training have you had with that -- or what training have you had with that?

A. Well, I had to attend the initial operator's school, which is a one-week school. I then was trained by our electronics staff who are factory trained and factory authorized to do service on the instruments.

Over the past 12 years, I've done thousands of tests with the Intoxilyzer 5000, and I've tested thousands of people primarily at controlled drinking exercises, which are events -- when we have our class, we'll have the officers on -- on Wednesday and Thursday afternoon the class is split in half, and the ones who volunteer to be dosed with alcohol are dosed with alcohol, measured amounts of alcohol, and then we measure their breath alcohol concentration during the afternoon. I've done that in -- again, in controlled drinking exercises. I don't know how

many people. Far greater than a thousand people.

Q. Mr. Glover, when you say that you have volunteers that are dosed with alcohol, are these volunteers that are volunteering to drink alcohol --

A. Yes.

Q. -- to see their alcohol concentration on the Intoxilyzer 5000?

A. That's correct.

THE COURT: It's probably difficult to get volunteers for that, isn't it?

BY MR. CRAVEN:

Q. Now, Mr. Glover, turning your attention to blood alcohol physiology, pharmacology, and related research. First of all, can you explain to the jury what that is?

A. What that is addressing would be how the body deals with alcohol; that is, when it gets -- when they consume it, how it goes from being in their mouth to being in their blood to being in their tissues, to being in their brain, and ultimately showing up on their breath. The physiological process is how it's all transported and dealt with.

The pharmacology aspect of it is what the alcohol does to the human body when it's in it.

Related research would deal with a number of studies that have been done for probably the past 70 years

where they've looked at those very things. What happens to the alcohol? What areas does it affect? How does it affect people? What effects do we see at different alcohol concentrations?

Q. And what experience have you had in dealing with that?

A. Again, when we dose individuals, they're alcohol free when we start out with them. We target them for .08 by giving them an amount of alcohol that's tailored to their weight and their gender. We want to get them to -- or try to get them to a .08.

MR. CRAVEN: Your Honor, at this time I would ask that Mr. Glover be tendered as an expert in breath alcohol testing; the Intoxilyzer 5000; and blood alcohol physiology, pharmacology, and related research.

THE COURT: Do you have his -- what -- where is the exhibit?

MR. CRAVEN: I'll get it for you (document tendered).

THE COURT: Any objection?

MR. MCMILLAN: With respect to the breath testing and the Intoxilyzer 5000, no, but with respect to pharmacology and physiology, yes.

THE COURT: Do you wish to ask the witness any questions?

MR. MCMILLAN: I would love to.

THE COURT: All right. Let me -- members of the jury, let me ask you to step in the jury room just a moment.

(At 11:13 a.m., the jury exits the courtroom.)

THE COURT: All right. Let the record show that all jurors are out of the courtroom.

Yes.

MR. MCMILLAN: Thank you.

VOIR DIRE EXAMINATION

BY MR. MCMILLAN:

Q. Mr. Glover, do you have any degrees in pharmacology?

A. I do not have a degree in pharmacology. I have a B.S. in biology that I got at Florida State University in 1974; and a master's degree in biology that I got at Florida State University in 1978.

Q. Do you have any degrees in physiology?

A. Not in physiology, though physiology would have been a component of my undergraduate degree.

MR. MCMILLAN: That's all the questions I have, Your Honor.

THE COURT: What training do you have with respect to this physiology and determination of alcohol -- the elimination of alcohol or the results of alcohol in the body?

THE WITNESS: My training has come from peer-reviewed papers that I have read, the training that I got at Indiana University, my own experience in dosing individuals with alcohol.

Through that training I know that alcohol when consumed by drinking goes into the stomach. It goes from the stomach into the first 12 inches of the small intestine through a valve called the pyloric sphincter. The pyloric sphincter admits the stomach contents into the small intestine. Once in the small intestine, alcohol is rapidly absorbed into the bloodstream through the small intestine. Once it's in the blood, it is distributed throughout the body.

Alcohol has a very, very high affinity for water and water-containing tissues. As alcohol is being distributed throughout the human body by the circulating blood, alcohol will go into water-containing tissues that have a lower alcohol concentration than the blood. So as blood is circulating it's basically distributing the alcohol into water-containing tissues that are at a lower alcohol concentration than the blood. As long as the alcohol concentration of the blood is greater than that of the tissues, it will be being distributed into those tissues.

While this whole process is going on, this alcohol is being moved through the liver. As it's

circulated, an enzyme in the liver called alcohol dehydrogenase will break down the alcohol. This is the way that 95 percent of the alcohol that's consumed by humans is eliminated. There is a limited amount of alcohol dehydrogenase in the liver, and because of that we know that humans have a limit to the amount of alcohol that it can -- that they can eliminate per hour. So if the consumption of alcohol is greater than the rate that the liver has or the capacity that the liver has to eliminate the alcohol, then the alcohol concentration will rise.

The best analogy is that of filling a bathtub with the drain open. As soon as you turn the water on, some water goes down the drain. If you turn it on fast enough, the water level in the tub will rise. All the while you've got water going down the drain. With alcohol, as you consume it some is immediately eliminated. If you consume it at a rate greater than you're eliminating, the concentration goes up.

There are no methods known to increase or decrease the rate of elimination in humans. The rate of elimination of alcohol in humans has been looked at for over 70 years. There are published, scientifically accepted average rates of elimination. Though there are or there is a range of rates, it's a fairly limited range. We do know that individuals who have vast experience with alcohol do

have higher rates of elimination. We see higher rates in people who have been charged with DWI. We see higher rates in people who have high alcohol concentrations and vast experience with it. Those rates in what are called ultrafast eliminators can be three times that of what we see in average people.

Alcohol is a central nervous system depressant. The area of the brain that's first affected by alcohol is the higher learning center. It's always affected. It becomes affected as soon as alcohol gets in the brain. As the concentration increases, then alcohol will have an effect on gross motor skills. If the concentration gets high enough, then it shuts down the body and the person dies.

THE COURT: So what's the rate of elimination for the normal person?

THE WITNESS: If we looked at individuals who have essentially no experience with alcohol, we see a rate that's been accepted by case law in North Carolina of .0165 BAC per hour. We have seen rates slightly lower than that, but as an average rate that is an accepted rate.

If we look at ultrafast eliminators, we can see rates as high as .054 BAC per hour.

Individuals who were tested who had been arrested for DWI in a study in Finland where they looked at about

35 -- or Denmark -- about 3500 individuals, they found the rate in males to be .018 BAC per hour and in females a rate of .020 BAC per hour.

THE COURT: How do you account for the difference between females and males?

THE WITNESS: The reason for the difference in males and females is that proportionately females have a larger liver than males. So if you take a 150-pound male, a 150-pound female, we see a larger liver in the 150-pound female. There is also the suggestion, though it's not been conclusively shown, that the blood flow through the liver may be better in females than in males, and so for that reason we see about a 10 percent faster rate of elimination of alcohol in females than males.

THE COURT: Any questions you want to ask him based on anything I've asked him?

VOIR DIRE EXAMINATION (CONTINUES)

BY MR. MCMILLAN:

Q. If I drank a pint of whiskey right here in front of you, chugged it down, can you tell me what my alcohol concentration was three and a half hours ago?

A. No. If that was -- if you are alcohol free before you started?

Q. Regardless of whether I'm alcohol free. If I drink a pint of whiskey right now, can you tell me what my

alcohol concentration was three and a half hours ago?

A. If we do an alcohol determination on you, and you give me your weight, I can tell whether or not all the alcohol represented in that test can be accounted for by the alcohol that you drank, and then I would go --

Q. Can you tell me what my alcohol concentration would have been three and a half hours ago?

A. Then I can calculate what it would have been based on the fact that you would have had a prior alcohol concentration, a prior alcohol consumption.

Q. If I drank an unknown quantity of wine, right here, right now, you didn't know how much it was, could you tell me what my alcohol concentration was three and a half hours ago?

A. I -- no. I can -- I can, however, give an opinion as to the -- whether an alcohol result presented by you could be the result of a specific amount of alcohol consumption.

Q. If you don't know the specific amount of alcohol consumption, is there any way you can make that determination?

A. I can make calculations.

Q. Certainly you can make calculations but can you come to a conclusion?

A. I -- I can -- I can come up with an opinion as an

expert.

Q. So if I drink an unknown quantity of alcohol right now, and you test me after the absorption period is over and I'm at peak, do you think you can tell me what my alcohol concentration was three and a half hours ago, if I drank an unknown quantity of alcohol, you have no idea what I drank?

A. No, but I can tell how much you would have to have consumed either then or what you would have to have consumed then plus what you would have to have consumed earlier. And if you have a glass this big and the calculation shows that you needed a glass three times as big, then obviously you had to have drunk alcohol before.

Q. So without knowing what I had to drink, you would only be speculating as to what I had to drink before?

A. I can do a calculation and give an opinion.

Q. As to how much I would have to drink to get to the level I was at the time I was tested?

A. And also factoring in the amount you eliminated between the time of the consumption and the time of the test. Yes.

Q. Without knowing whether or not I had consumed any alcohol before, and without the three-and-a-half-hour period, and without knowing how much I had to drink at the known time, you couldn't tell me anything, could you?

A. You'll have to -- you'll have to say that again.

THE COURT: I was lost on that one.

BY MR. MCMILLAN:

Q. Without knowing how much alcohol I had to drink, you could test my breath and you could tell me how much I had to drink, correct?

A. If we do an alcohol test on you, and we have a window of time where we know you weren't consuming, couldn't have been consuming, and then we have a window of time when there is a claimed amount to have been consumed, I can tell you how much you would have to have consumed in that window if all of the alcohol in your system was a result of that consumption.

Q. And if you don't know whether all the alcohol was a result of that consumption or some other consumption, would your calculation be anything other than speculation?

A. It's not speculation. The other thing that I take into consideration when I form an opinion is any other evidence that might be -- or any other information that might be in evidence, such as a person who appears to be impaired, a person whose behavior appears to be impaired behavior, and if that's consistent with what the calculation would have been, then it validates or gives me confidence in my calculation.

Q. Are you planning to testify here that my client's

alcohol concentration prior to 8:00 o'clock at night on December 14th of 2006 was some particular level? Is that what you're planning to do?

A. Depends on the questions I get from the prosecutor. I don't know if I'm going to be asked to give a calculation of the alcohol concentration at the time of the driving with the assumption of no consumption in between. If I'm asked to do that, I can do that.

Q. If -- if you have no information whatsoever as to whether or not alcohol was consumed prior to the time of driving, if you have no information at all, and you have a breath test result three and a half, four hours later, what could you tell the Court?

A. What I can tell the Court is I will take the breath test result that was reported at approximately 11:30. I don't have the exact time in front of me. I can then calculate with certain assumptions what the concentration would have been at the time of the driving. The assumptions would be if there was no consumption after the driving, I can calculate what the alcohol concentration would have been. If the assumption is it -- the subject was zero alcohol at the time of the driving, I can calculate how many ounces of a particular beverage he would have to have consumed in the roughly hour and a half window that he had to consume that much -- that amount of alcohol.

If I am then asked to calculate what the alcohol concentration would have been at the time of the driving, with the assumption of the consumption of one five-ounce glass, two five-ounce glasses, five five-ounce glasses, or five glasses that could have -- five glasses of wine that could have provided for the total amount of alcohol in the system -- so the size of the glass would have to be figured.

Q. Okay. And without knowing the size of the glass, can you do anything about that?

A. I have to put in certain assumptions and that would be the size of the glass. If --

Q. But if you don't know the size of the glass -- how can assuming something that you know nothing about shed any light on this case?

A. We have an alcohol -- a reported alcohol concentration and we have a crash time. I can calculate what the alcohol concentration would have been at the crash time. If we then assume that there were five glasses of wine that were consumed during the drinking window postcrash, and that the subject was zero alcohol at the time of the crash, then those five glasses of wine would have to have been 18-ounce glasses of wine.

Q. If the, well, as you say, postcrash consumption included whisky, what would that have to do about your --

THE COURT: Well, objection sustained to that

because there's no evidence there was any whiskey found.

MR. MCMILLAN: Well, Judge, the point is there's no evidence at this time of the consumption of any alcohol before the crash.

THE COURT: I understand that. I understand that but I'm not going to let you throw in the consumption of whiskey because there's no -- now we're just speculating and there's no evidence of --

MR. MCMILLAN: The point is he's speculating.

THE COURT: Well, I agree. I mean, I heard you -- I mean, I'm not going to -- I've allowed you to go into this with regard to what his testimony is, but I'm not going to allow you to go into testimony about something there's no testimony about.

BY MR. MCMILLAN:

Q. Okay. Any high school senior can read the articles that you have read that have been peer reviewed and learn the little formulas that you're talking about, can't they?

A. They can. They would not have had experience in measuring alcohol concentration in individuals and actually observing alcohol concentration decrease nor would they have had experience in calculating rates of elimination that we see in individuals to see firsthand that in fact people do eliminate them and that the rates that are published are

reasonable rates.

Q. Have you ever had any peer-reviewed articles in pharmacology or physiology?

A. No.

Q. Okay. But you talked about some of your experiments and controlled drinking stuff. And you-all start with an alcohol-free subject to start with, don't you?

A. We do.

Q. And you have controlled doses, don't you?

A. Excuse me?

Q. You use controlled doses, knowing exactly what quantity of alcohol is being served?

A. We do and that way we know that if we give a 200-pound male a six-pack, in an hour we can expect a .06 to result from that. That's what we learned from doing the controlled experiments.

MR. MCMILLAN: I have no further questions. And I object to his qualifications.

THE COURT: All right. Your objection is noted and overruled. I'm going to let him testify and give his testimony as an expert in those fields when we bring the jury back, but we're going to take a recess after we bring them back.

(At 11:30 a.m., the jury enters the courtroom.)

THE COURT: All right. The objection is

overruled. The witness may give opinion testimony or otherwise is qualified as an expert in those fields.

And your exception is noted for the record.

Members of the jury, before we go any further, we're going to take our morning recess. Please keep an open mind. Don't form any opinions. I need you back in your jury room at 11:45.

(At 11:31 a.m., the jury exits the courtroom, and a recess is taken.)

(At 11:46 a.m., Mr. Craven, Mr. McMillan, and the defendant are present.)

PAUL GLOVER

resumes the stand and testifies further as follows:

THE COURT: Okay. Anything before we bring the jury back?

MR. CRAVEN: Not from the state, Your Honor.

THE COURT: All right. Bring the jury back then.

A COURT DEPUTY: (Complies.)

(At 11:48 a.m., the jury enters the courtroom.)

THE COURT: All right. You may continue.

MR. CRAVEN: Thank you, Your Honor.

DIRECT EXAMINATION (CONTINUES)

BY MR. CRAVEN:

Q. Mr. Glover, can you please tell the jury what postdriving consumption is?

A. Postdriving consumption is a situation where we have a driving event, whether it's a vehicle stop or a crash, and then at some point after that event there is a claim of consumption of alcohol.

Q. And when there's a claim such as in this case, can you determine whether that's true or not?

MR. MCMILLAN: I object, Your Honor.

THE COURT: Well, overruled.

Can you?

THE WITNESS: I can evaluate it and give an opinion as to what I'll say is a probability of it.

BY MR. CRAVEN:

Q. What factors do you use in coming to that probability?

A. We look at the time of the event. That would be the time of the vehicle stop or the crash. We look at the time of the alcohol test, whether it's a blood draw or a breath alcohol test. We would then look at the size and gender of the individual. We would look at what was claimed to have been consumed and kind of, I'll say, crank the numbers once we get all of that to look and see is it possible for the amount that was claimed to be consumed to have caused the alcohol concentration that we're looking at.

Q. And is it necessary for you to have all of that information to make a determination?

A. I don't have to have it all. The more of it that I have the more reliable the result will be.

Q. And with that information can you tell the jury what it is that you determine with it?

A. Yes. I can give a calculation as to what the alcohol concentration was at the earlier time and then factor in the contribution of what would have been -- what was claimed to have been consumed.

Q. And how do you know how to make these type of calculations?

A. Well, we do controlled drinking exercises on a regular basis with the officers in the class. We know -- with formulas, we know how much to give a hundred-pound female or a 200-pound male. If they're drinking beer or wine or hard liquor, we know how much -- what volume to give them based on their weight and gender in order to get them to a targeted alcohol concentration.

Q. And can you please tell the jury what a controlled exercise drinking program is?

A. This is when we take our students -- they're alcohol free. We -- again, we take their gender and their weight and do the calculation to get them to an alcohol concentration. We then give them their drinks over about 45 minutes, and then we split it into -- if they're mixed drinks, we'll give them three mixed drinks, basically split

their alcohol into three doses. If they're drinking beer, we let them basically drink it as fast as they want because most of them are going to be restricted to a six-pack just because of the time involved.

Q. Have you conducted any of those controlled exercises?

A. Yes, I have.

Q. Do you know approximately how many?

A. I can't tell you the number of exercises. I know I've been involved in dosing over a thousand people, and whether it's a thousand or 2,000, over the past 12 years I've been involved in it. My staff has been involved in it. We dose prosecutors at new prosecutor school. We dose District Court judges at their training schools. And we dose the students in our breath alcohol instrumentation classes. We dose volunteers if we're conducting a standardized field sobriety test training. That's when we teach the officers how to do the finger-to-nose and walk-the-line and all of those tests. We have to have individuals with alcohol on board for these officers to conduct the tests on. So we dose all kinds of people.

Q. And after these people are dosed, do they have a ride home?

A. Not only do they have a ride home, they have to have a signed form before they can even start indicating

that they will not drive and that they do have someone. We have to confirm that they have a person to take them home.

Q. Have you been able to observe the impairing effects of alcohol on humans during these exercises?

A. Yes. We've observed it just every time we do it. We just did one last Wednesday night in Durham. And you get to observe the individuals and their demeanor as the alcohol concentration goes up in them. Typically we're targeting people for 08. Sometimes we'll miss that mark. They may be only an 06. They may be a .10. There have been some events where it was not a controlled event; in other words, we weren't controlling the dosing. We were just there to test people, and we've seen people on up into the .20s. So --

Q. As you've observed -- as the alcohol concentration goes up, what if any difference in behavior have you observed?

A. Well, alcohol is a central nervous system depressant. But initially it actually acts more like a stimulant. There's a period of euphoria that you see at the lower concentrations. As the concentration goes up, it presents itself as more of a depressant. You can see a range of behaviors. You'll see happy impaired people and sad and all in between. It affects their cognitive skills. The higher learning center of the brain, which is the most recently developed area of the brain, it impacts on that

first, and it always impacts on that.

As the concentration goes up, we get into the teens, we're going to start seeing effects on gross motor skills, and that would be inability to do certain tests, difficulty in walking, the kind of behavior you would see or associate with Otis on Mayberry.

If you go even higher, if you get up to, say, a .40, that's where we see deaths occurring and when we see college students that binge. Once you get into that range, that's when you completely shut down the central nervous system and people die.

Q. Why does it take time for this to happen?

A. Well, you have to absorb the alcohol. When you consume alcohol by drinking, it goes down your throat into your stomach. There's a valve in the bottom of your stomach called the pyloric sphincter. This valve opens and emits the contents of your stomach into the small intestine. In the first 12 inches of the small intestine alcohol is rapidly absorbed. They compare it to pouring water through a croker sack. It just -- it almost goes through it instantly. It goes into the blood. It's distributed throughout the body.

We see impairment because of alcohol having an effect on the brain. The alcohol has to get distributed to the brain, into all the water-containing tissues in the

body. So it takes some time.

In experiments that are called bolus-dosed experiments, which is you take an alcohol-free person, you give them a single big drink, they drink it all at once, and then we watch the alcohol concentration go up and then start to come down. We can see them at their peak concentration. And 15 minutes is rare. A half hour is reasonable. Forty-five minutes is reasonable to get to that peak concentration.

If we looked at a social drinking situation, we don't see a nice straight line up and a straight line down. So we see at -- you know, at a three or four-hour drinking event we'll see the concentration go up in little stairsteps.

Q. And during these controlled drinking sessions, as you've seen the alcohol concentration go down what if any change in behavior have you noticed?

A. You'll see the person will still be impaired, but you'll see some change, but it takes -- it takes time. Your alcohol concentration only goes down approximately .0165 per hour, and so the difference from someone who is at a .12 to someone who is at a .11, and an hour goes by, you've only decreased it by .016, so you're not going to see a dramatic change in that period.

Q. What is it that you measure a person's alcohol

concentration during these controlled drinking sessions?

A. We use our evidential breath test instruments. We use the Intoxilyzer 5000. From 1991 until August of last year, we transitioned, starting in February of last year, into a new evidential instrument that's called the Intox EC/IR II.

Q. Now, Mr. Glover, have you listened to the testimony that's been given up to this point?

A. Yes, I have.

Q. And in your expert opinion, could Mr. Green have consumed the alcohol that he claimed to have consumed?

MR. MCMILLAN: Objection.

THE COURT: Overruled.

THE WITNESS: Could he have claimed the alcohol that he claimed to have consumed? He could have consumed it with some limits.

BY MR. CRAVEN:

Q. Can you please explain what you mean by "limits"?

A. Well, there's -- there's, I'll say, almost no restriction on the volume that a person could consume. So five glasses, if it was five glasses of five-ounce glasses of wine, that's certainly reasonable and doable. However, it would not have resulted in the reported alcohol concentration. And so you -- your volume per glass is going to have to increase dramatically to be able to reach that

alcohol concentration if that was all of the alcohol that was consumed.

Q. Well, in this case, Mr. Glover, what factors did you use in coming to the conclusions that you have?

A. I looked at the reported alcohol concentration at the time of the test, which is a .19. I then looked at the time of the vehicle crash -- or depending on how you look at it. His vehicle didn't crash. The other one did. But at that time of that event. We have a lapsed time of 3.36 hours or 3 -- and actually I believe it was 3.5. But at any rate, you multiply that times the rate of elimination. That tells me how much alcohol was burned off by the body in that window of time. That would have been a .05, once we drop off the third digit. If I take that .19 that was the reported alcohol concentration, and when we go back to the time of the crash, it's called retrograde extrapolation, my calculations are that at the time of the crash or at the 8:06 --

THE COURT: Objection sustained.

Let me just ask you to make some reference other than the crash because there's no evidence that his vehicle crashed. So I don't know how you need to phrase that but let's not phrase it as crash because that doesn't refer to what his vehicle actually did, all right, according to your testimony.

All right.

BY MR. CRAVEN:

Q. When the accident happened and that was at 8:06; is that correct?

A. Using roughly 8:00 o'clock, 8:06, the time of the 911 call, if I go back to that time, then my calculations are that the defendant's alcohol concentration would have been a .24.

MR. MCMILLAN: Well, I object and move to strike, Your Honor.

THE COURT: Overruled.

THE WITNESS: That does presume with that calculation that there was no alcohol consumption after the driving on the part of the defendant.

BY MR. CRAVEN:

Q. And you heard the testimony where the defendant's first statement to Officer Larsen was that he had zero to drink once he got home?

A. That's correct.

Q. And you're basing your opinion that at -- based on that statement that he would have been a .24 at the time of the accident; is that right?

A. Correct.

Q. Now, under Mr. Larsen's -- or Officer Larsen's testimony, you also heard that Mr. Green went from zero to

one glass of wine. If indeed he had one glass of wine at his home, what would his alcohol concentration have been at the time of the accident?

MR. MCMILLAN: I object.

THE COURT: Overruled.

THE WITNESS: Based on his size and gender, and making assumptions, because we have to make certain assumptions, that it was a five-ounce glass of wine, then we would reduce that value by .01. So it would be a .23.

MR. MCMILLAN: I object and move to strike.

THE COURT: Overruled. Exception noted.

BY MR. CRAVEN:

Q. And, Mr. Glover, you heard -- did you hear Officer Larsen also testify that again Mr. Green changed how much he had to drink after he got home to five glasses of wine? Were you able to make a calculation using that?

A. Yes. If again we assumed five five-ounce glasses of wine, we would reduce the value at the time of the 911 call or accident by .05, which would make it a .19 at the time of the accident.

Q. And just so I -- for clarification, so even if he had drank five glasses of wine at his home, his alcohol concentration at the time of the crash would have been a .19?

A. Correct.

MR. MCMILLAN: I'd object and move to strike.

THE COURT: Overruled. Exception noted.

BY MR. CRAVEN:

Q. Now, Mr. Glover, using your calculations, were you able to determine if Mr. Green's first statement that he had -- well, motion to strike, please.

Were you able to determine if the only drinking of wine that Mr. Green did was at his home for the approximate hour and a half, hour and 45 minutes that he was there, how much he would have had to have drank to be a .19 at 11:28 when he took the Intoxilyzer 5000?

A. Yes.

Q. What was that?

MR. MCMILLAN: I object and move to strike.

THE COURT: Overruled. Exception noted.

Yes.

THE WITNESS: If he was -- if his alcohol concentration was zero at the time of the driving, and then all the alcohol that was measured in him at 11:30 was the result of alcohol consumed during that window of time after the driving, then he would have to consume 88 ounces of wine.

BY MR. CRAVEN:

Q. And 88 ounces, what is that in relation to, say, a quart?

A. Well, there are 32 ounces in a quart. So there are -- 96 ounces would be three quarts. So it's just under three quarts.

Q. Do you know in pints?

A. That would be between five and six pints. Sixteen ounces in a pint.

Q. And do you have an opinion as to the effect that would have on Mr. Green's behavior if he had drank only in that time period to reach a .19 at the time he -- at 11:28?

A. I would have expected there to be a dramatic difference in his behavior as observed at the time of the accident and the time that the officer encounters him.

Q. And from the testimony that you heard, did you hear that change of behavior?

MR. MCMILLAN: Well, I'd object, Your Honor. He didn't make any observations of the defendant.

THE COURT: Sustained.

BY MR. CRAVEN:

Q. Now, Mr. Glover, there's been some testimony as to the smell of mouthwash. What if any effect would mouthwash have on the alcohol concentration at 11:28?

A. It would have had absolutely no effect on it.

Q. Can you explain to the jury why it would not have an effect?

A. Well, some mouthwashes contain alcohol. They

don't all contain alcohol. But when -- when alcohol -- when mouthwash is used, typically it's swished around and spit out. If it was an alcohol-containing mouthwash, and if somebody swallowed a significant amount, in fact that would add to the alcohol concentration. But if it's swished in the mouth, spit out, then within 15 minutes of that we know that any alcohol that would have been in the mouth is gone. That's why we have our observation period where we ensure that they are not putting anything in their mouth.

We've done tests in the past with alcohol-free people. They can take a shot of brandy, hold it in their mouth, spit it out. We wait 15 minutes. If they were alcohol free before they did that, and we test them 15 minutes after they spit it out, we'll get zero zero on the breath test.

Q. So, Mr. Glover, under any of the statements that Mr. Green gave Officer Larsen about how much he had to drink since he had been home, are there any of them that he would have been below a .19 at the time of the accident?

MR. MCMILLAN: I object.

THE COURT: Overruled.

THE WITNESS: Again, with having to make the assumption of a five-ounce glass of wine, then no.

MR. MCMILLAN: Then I object and move to strike based on the assumption, Your Honor.

THE COURT: Overruled.

THE WITNESS: If in fact 88 ounces of wine were consumed after the driving, then that could account for the alcohol concentration reported when the breath test was done.

BY MR. CRAVEN:

Q. So if he indeed drank five or six pints of wine in that hour and 45 minutes, that could account for the .19?

A. Yes.

MR. CRAVEN: No further questions.

THE COURT: Cross-examine?

CROSS-EXAMINATION

BY MR. MCMILLAN:

Q. You don't purport to be a scientist, do you?

A. Yes, I do.

Q. Do you have any graduate degrees in any sciences?

A. Yes, I have a --

Q. In biology; is that correct?

A. I have a master -- a master's degree in biology that I got at --

Q. Thank you. Would you please just --

A. -- Florida State.

Q. -- answer my question, sir?

THE COURT: Allow him to finish his answer, counselor.

BY MR. MCMILLAN:

Q. Okay. Finish your answer.

A. A master's degree in biology that I got at Florida State University in 1978.

Q. Do you have any degrees in pharmacology?

A. No, I do not.

Q. Do you have any degrees in physiology?

A. I do not have a degree in physiology though physiology was a part of my undergraduate degree.

Q. And you learned about how stuff you put in your mouth goes down your esophagus and goes into your stomach. And you've got a pyloric sphincter there that controls the passage of the contents from your stomach into your small intestine. Did you learn that at Florida State University?

A. A portion of it, basic physiology and how the body is put together. More specifically, the events regarding alcohol is something that I've learned over the past 12 years.

Q. Right. But actually you learn stuff about the esophagus and the stomach and pyloric sphincter and the small intestine in tenth-grade biology, don't you?

A. I don't remember if I got it in tenth grade.

Q. All right. How long have you worked for the State of North Carolina?

A. On August 31st it will make 12 years.

Q. And how many times have you testified for the state in an effort to convict somebody of drunk driving?

A. I have testified for the state in excess of 220 times.

Q. Have you ever testified for a defendant to do a retrograde extrapolation to determine that he was not impaired at the time of the driving?

A. I have not testified to that nor have I been asked to do that. I've been subpoenaed by the defense over a hundred times and have been called to testify by the defense at least seven different times.

Q. All right. How much alcohol did Mr. Green have to drink between 8:00 o'clock p.m. on December 14th, 2006, and 9:50 p.m. on December 14th, 2006?

A. How much alcohol did he have to drink?

Q. Yes.

A. In order to be a point --

Q. No, how much did he have to drink?

THE COURT: Wait, wait, wait, Mr. McMillan.

Let me see you-all at the bench for a second.

(A bench conference is had off the record between the Court and counsel.)

MR. MCMILLAN: Let me rephrase the question, if I may.

BY MR. MCMILLAN:

Q. Do you know how much alcohol Mr. Green had to drink between 8:00 o'clock p.m. on December 14th, 2006, and 9:50 p.m. on December 14th of 2006?

A. The only way that I can answer that question is to put assumptions in; that would be with an alcohol concentration reported at a given time, which we do have it at about 11:30, and with the condition of what his alcohol concentration was at the time of the accident.

Q. Okay. Well, I thought I had asked a yes or no question. I may not have.

But without making any assumptions, sir, do you know how much alcohol Barry Green had to drink between 8:00 o'clock p.m. on December 14th, 2006, and 9:50 p.m. on December 14th, 2006?

A. The answer to your question can't be answered. I can't give an answer as to how much. That's a question without -- you can't -- nobody can answer that.

Q. Isn't the answer no, you do not know?

A. You've not asked a question that has the right parameters to it. You have to have some parameters on your question. It's like saying do you know how fast a car was going when you have no time points, no distances or anything else.

Q. I simply asked, without making any assumptions whatsoever, do you know how much he had to drink that

evening after he got home?

A. I do not know how much he had to drink.

Q. Thank you.

Do you know if he had anything to drink before 8:00 o'clock p.m.?

A. As you've asked it, no.

Q. Do you know whether the minty smell that Officer Larsen detected on his breath was mouthwash or peppermint schnapps?

A. I do not know.

Q. Did your calculations with the various assumptions that you make assume an alcohol concentration of whatever it was he may have had to drink?

A. My calculations included two different time points, a reported alcohol concentration at one time point --

Q. I'm sorry. If I may interrupt. And I apologize. My question was, did you make any assumptions on the alcohol concentration of whatever substances he may have consumed?

A. Oh, yes, I did. I assumed 12-percent wine.

Q. Is some wine 14 percent?

A. Some wine is 14. Some four to five wines are 20 percent.

Q. Really?

Did you run your calculations with the 20-percent

figure?

A. No, I did not.

Q. Did you run your calculations adding in four to five whiskeys?

A. No, I did not. I've not heard any testimony about the consumption of any whiskey.

Q. You heard of course that the defendant gave a variety of statements to the officer about what he had consumed at home, correct?

A. That's correct.

Q. The truth is you don't know what he had consumed at home, do you?

A. That's correct.

Q. Are the rates of absorption different for a person who has a full stomach as opposed to a person who has an empty stomach?

A. We don't see really -- rates of absorption don't really measure rates of absorption. We see difference in the roots of absorption. That is, if you have a full stomach, you will have more absorption occurring through the stomach wall as opposed to through the pyloric sphincter. And so while it -- the root will change, ultimately we'll get to the same alcohol concentration.

Q. Did you testify that the rates of absorption don't really measure rates of absorption?

A. I'm saying we don't really -- we don't have established rates of absorption. There aren't published rates of absorption. We have rates of elimination because that's something that can be measured. Rates of absorption are not -- there aren't published rates of absorption.

Q. Now, absorption occurs much more slowly through the stomach wall than through the small intestine; is that --

A. It occurs somewhat slower but it's not significant.

Q. And if the stomach is full, the pyloric sphincter will not open up and allow the alcohol to pass into the small intestine, will it?

A. It opens up and just opens and allows a limited amount of the contents in.

Q. It restricts the amount that is absorbed through the small intestine, correct?

A. Yes, but --

Q. And it is absorbed -- it is absorbed more quickly through the small intestine, correct?

A. It is absorbed more quickly through the small intestine.

Q. All right. Is there a distinction between the rate of absorption or the rate of elimination in a person who's asleep as opposed to one that is awake?

A. You're wanting to compare absorption and elimination or --

Q. Yes.

A. I don't know that there are any studies that have looked at absorption in sleeping people, and there aren't to my knowledge any -- there are no things that impact significantly on the rate of elimination.

Q. Did you make any calculations based on the assumption that the defendant's alcohol concentration at 8:00 o'clock was .05?

A. No, I did not.

Q. So you have no idea in fact if the defendant's alcohol concentration at 8:00 o'clock was zero or .05, do you?

A. I have no information to that.

Q. And all of these various tests that you have performed over your 12 years in your current position were with individuals with a known zero alcohol concentration as a baseline, correct?

A. That's correct.

Q. You had carefully measured and precise doses administered to the folks, correct?

A. That's correct.

Q. And you were there monitoring them while they were consuming and periodically during your observation of

them, correct?

A. That's correct.

Q. Tell me a little bit more about bolus drinking.

A. A bolus drinking experiment is one where you want to give an individual a certain amount of alcohol. They drink it all down at once. Like having a "screw driver," you drink it down in five minutes, hopefully in less than ten minutes. You're trying to instantly put all the alcohol in that person's system so that you can see a straight line concentration going up.

Q. What is the defendant's weight?

A. According to his booking sheet, 250 pounds at that time.

Q. Do you know if that's correct?

A. I'm relying on that.

Q. Do you know -- you don't know what the source of that information was?

A. I do not.

Q. Have you ever published any articles subject to peer review in the field of pharmacology or physiology?

A. No, I have not.

Q. Have you ever published any articles subject to peer review in the field of retrograde extrapolation?

A. No, I have not.

Q. All of your work in those fields has been as an

employee for the State of North Carolina as branch head of the Forensic Tests for Alcohol Unit; is that correct?

A. That's correct.

Q. And all of your testimony here is based on assumptions whose validity are unknown, correct?

A. No, it's based on facts that are there and then certain assumptions. But there are facts in the case that I have to use.

Q. Right, there are some facts. I apologize. But there are also some assumptions that you have made, and you have no way of knowing whether those assumptions are correct or not?

A. I've put, I'll say, limits on those assumptions or explained them.

Q. Like, for instance, you assumed 12-percent alcohol by volume for wine as opposed to 20 or 14?

A. That's correct.

Q. And you assumed five-ounce glasses of wine, correct?

A. For the purposes of calculating what effect it would have had on his alcohol concentration at the time of the driving, yes.

Q. And you assumed that Mr. Green was honest when he told the officer he had had five glasses of wine?

A. I don't know that I --

Q. You took that statement and accepted it for purposes of doing your calculations?

A. I listened to all of the different statements, from zero glasses of wine to drink to one to two to three to four to five, and I simply applied those to the scenario.

Q. And you don't know whether Mr. Green was minimizing the amount of alcohol he had had at home or not, do you?

A. Don't know.

Q. If I chugged a pint of whiskey right now --

MR. CRAVEN: Objection.

THE COURT: Overruled.

BY MR. MCMILLAN:

Q. -- when would you expect me to reach my peak alcohol concentration?

A. Probably in about a half hour --

Q. Okay.

A. -- given that I am assuming you haven't had anything to eat since breakfast. I'd assume you have a fairly empty stomach, and I'd say you would be peaked at right about a half hour.

Q. And could you then tell me what my alcohol concentration was three and a half hours ago?

A. If I did an alcohol concentration -- if I determined your alcohol concentration after drinking the

whiskey, I could calculate what your alcohol concentration would have been three and a half hours earlier.

Q. And would the proof of the whiskey make a difference?

A. To a degree but we're looking at 40 to 50 percent in the -- virtually all of them that are out there.

Q. You of course didn't see the incident that occurred there at the intersection of Glendower and Lynn Road, did you?

A. I did not see it. I only heard the testimony about it.

Q. And you don't know what time the accident happened, do you?

A. Again, I heard testimony about the time that the call was received by the 911 center.

MR. MCMILLAN: That's all I have. Thank you very much.

THE COURT: Any redirect?

MR. CRAVEN: Your Honor, just a question or two. Thank you.

REDIRECT EXAMINATION

BY MR. CRAVEN:

Q. Mr. Glover, does the fact that you work for the State of North Carolina in any way affect your calculations or conclusions that you came up with for Mr. Green?

A. No. If I had been asked by the defense counsel to do this -- if I were in a position to work not for the state but as an independent expert, and I would be asked the same scenario by the defense counsel, my answers would have been the same.

MR. CRAVEN: No further questions.

THE COURT: Any recross?

RECROSS-EXAMINATION

BY MR. MCMILLAN:

Q. How long does it take you to do the calculations that you described here for the jury?

A. It depends. Most of them, I'll say, I can do in my head, depending on how complex; otherwise, I use a calculator.

THE COURT: No, the question was --

Did you say how long?

MR. MCMILLAN: How long. He answered the question.

THE COURT: Okay.

THE WITNESS: Well, I can't --

THE COURT: I mean, just a rough estimate.

THE WITNESS: A few minutes --

THE COURT: Okay.

THE WITNESS: -- depending on what I have to do and how many different factors you want to throw in.

THE COURT: Okay.

BY MR. MCMILLAN:

Q. And the more facts that you have that are known, the more reliable your calculations are, correct?

A. That's correct.

Q. And the more that are unknown, the less reliable your calculations are?

A. That's correct.

MR. MCMILLAN: All right. That's all I have. Thank you.

THE COURT: Anything else?

FURTHER REDIRECT EXAMINATION

BY MR. CRAVEN:

Q. How many factors -- or strike that.

What factors did you use in this case?

A. I used the time of the 911 call. I used the time of the breath alcohol test, the results of the breath alcohol test, the weight of the defendant on the booking sheet, and the gender. Also I know that there was a narrow window for possible consumption. There was no consumption after the officer got to the house. So I have a -- about an hour and a half window after the 911 call before the officer got there.

Q. Did you also use Mr. Green's statements he gave to Officer Larsen about what he had to drink?

A. I used those. I don't -- I don't consider those to be facts. I consider them to be variables or variations. The other things, the times and the results, are facts.

MR. CRAVEN: Nothing further, Your Honor.

THE COURT: (Indicating.)

MR. MCMILLAN: No thank you.

THE COURT: All right. You may step down.

Any other evidence for the state?

MR. CRAVEN: Your Honor, may I approach for the exhibits --

THE COURT: Yes.

MR. CRAVEN: -- that have been --

(There is a pause in the proceedings.)

MR. CRAVEN: Your Honor, there is no further evidence for the state, but I would ask to publish State's Exhibits 1 through 7 to the jury.

THE COURT: All right. You may do that at this time.

Members of the jury, remember my admonition. You can look at them as long as you like to but do not discuss them or confer with each other while you're examining them.

MR. MCMILLAN: May I take a quick look?

THE COURT: Yes.

MR. CRAVEN: (Exhibits tendered.)

(There is a pause in the proceedings.)