MR. SANDERS: No.

THE COURT: You may step down. Any further need of this witness?

MR. TRIVETTE: No, Your Honor. We would like to let him go home if we could.

MR. SANDERS: He can go back to Raleigh as far as I'm concerned, Your Honor. I don't have any further need of him.

THE COURT: Wait just a second, Mr. Stark. Let me see counsel at the bench just a moment.

(Whereupon an off-the-record discussion was held.)

THE COURT: You are released, Mr. Stark. Call your next witness, please.

MR. TRIVETTE: State would call Paul Glover.

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PAUL L. GLOVER, called as a witness on behalf of the State, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. TRIVETTE:

Q. State your name, please, sir.

A. My name is Paul Glover.

Q. And Mr. Glover, where do you live, sir?

A. In Durham.

Q. And how are you employed?

A. I am a research scientist in the Forensic Tests for Alcohol Branch, which is part of the Department of Heath and Human Services.

Q. And could you describe briefly-- what is your title?

A. I'm a research scientist.

Q. And describe briefly, what is the area that you are involved in?

A. I am involved in evaluating the breath test program, the blood test program for the State D.W.I. program. I evaluate breath test equipment. I evaluate the analysts in the state that are certified for testing blood for drugs and alcohol and I evaluate scientific literature to keep up with what is happening in the world of science as it relates to blood and breath testing.

Q. Is one of the areas that you stay on top of or continue to do research or continue to educate

yourself in the area of blood alcohol physiology and pharmacology?

A. Yes, it is.

Q. Could you tell us what academic degrees you hold and from where and when you received them?

A. I've got a B.S. in biology from Florida State University I got in 1974, and an M.S. in Biology I got at Florida State in 1978.

Q. Could you tell us what, if any, type of degrees or training you have received over the years in this particular area?

A. I am certified as a chemical analyst for the state for breath testing. Also certified to do preventative maintenance of breath testing instruments. I have attended the school in Indiana for highway safety supervisors in D.W.I. programs.

Q. And could you tell us what-- after you received the formal education, what positions you have held since you received the Master's Degree?

A. I was a research scientist at Oak Ridge National Laboratory in Tennessee for seven years, research scientist at the National Institute of Environmental Health Sciences for five years and a research scientist for Bursewell Pharmaceutical Company for seven years.

Q. And then approximately when is it that you began to work for the Forensic Tests for Alcohol Division of the state of North Carolina?

A. I started about two and a half years ago.

Q. All right. And is part of your duty in your current position to maintain a laboratory there in Raleigh?

A. Yes, it is.

Q. What do you do there?

A. I have it set up so that I can evaluate breath test equipment or other issues that come up as they relate to different cases.

Q. All right. And have you presented or published some in this field that we have been discussing?

A. I have presented some of my work at the-- a conference, the International Association for Chemical Testing. I'm a member of that group. I'm also a member of the International Council on Drugs, Alcohol and Traffic Safety, will be presenting some more work there in May.

Q. Let me ask you if you are a member of any professional societies?

A. Just the two I just listed.

Q. All right. And have you ever testified in

court as an expert in the field of blood alcohol physiology and pharmacology?

A. Testified in court in North Carolina, qualified as an expert about 20 times in the past two years.

MR. TRIVETTE: Your Honor, I would tender Mr. Glover as an expert in the field of alcohol breath testing, blood alcohol physiology and pharmacology.

MR. SANDERS: No objection.

THE COURT: Allowed.

BY MR. TRIVETTE:

Q. Mr. Glover, I would like to ask you a few questions about how ethanol affects and is processed in the body. Well, first of all, what is ethanol?

A. Ethanol is alcohol that we find in beverages that are consumed.

Q. Now, are there other kinds of alcohol?

A. Oh, yeah, there are lots of other kinds of alcohols. This is the one, like I say, that people drink in beverages.

Q. All right. And when a person drinks, takes a drink of alcohol or ethanol, what begins to happen in their body to the ethanol?

A. Well once it's swallowed, it goes into the stomach. Once it's in the stomach there is some absorption through the stomach walls. There is a valve in the stomach called a pyloric sphincter that lets the contents of the stomach go into the small intestine. It opens on a fairly regular basis, you can say about every 15 minutes. But that opens up, allows the contents to go through. When alcohol gets into the first 12 inches of the small intestine, it's almost immediately absorbed through the small intestine and picked up by the blood.

Q. And where is it in the body that the bulk of the absorption occurs?

A. Well, it's a combination of the stomach and the small intestine. If the stomach is relatively empty, the majority of it is absorbed through the small intestine. If there is some additional contents in the stomach then you will have more absorption through the stomach.

Q. And of course where is the blood being absorbed into?

A. Well, the alcohol is going into the circulating blood.

Q. Okay. Goes into the blood?

A. Yes.

Q. If a person-- you indicated something about food in the stomach. On an empty stomach, does a person absorb faster than a person who has food in their stomach?

A. They tend to absorb faster when the stomach is empty.

Q. All right. Now, is there a difference in men and women of how alcohol is absorbed by the body?

A. Well, alcohol is attracted to water. Males tend to have a higher percentage of water than females. It's absorbed the same way but since there is less water in females, it takes a smaller amount of alcohol to get a female to the same concentration that it would take to get a male of equal weight.

Q. And that difference is because--

A. Just because of the amount of water.

Q. And females have less water in their body than males, generally speaking?

A. Yes.

Q. Now, let me move from absorption to elimination. How is alcohol eliminated or what are the different ways that alcohol is eliminated from the body?

A. You can lose some through the breath, some through sweat and urine but about 95 percent of it has

to be metabolized.

Q. And what do you mean by that?

A. It's metabolized in the liver. There is an enzyme called alcohol dehydrogenate in the liver. As the blood goes through the liver it brings the alcohol in there. If there is enzymes available to break alcohol down then it will bind, breaks the alcohol down.

Q. And is there-- based upon your training and experience, is there some-- is the rate of metabolism of alcohol a consistent or fixed rate?

A. There is-- it varies again according to if you are male or female, and there can be some individual variations. But there is a fairly predictable rate and over, say, a given period of time you will look at a fairly constant rate for a given individual. You can't slow it down, you can't speed it up. Once the alcohol has been consumed and absorbed and distributed through the body you are dependant upon your blood to bring that alcohol to the liver for breaking it down. Going to sleep, drinking coffee, none of those things will do anything to break that alcohol down any faster.

Q. You say there is a difference between men and women?

A. Yes, there is.

Q. And what is the difference there?

A. Women tend to metabolize alcohol faster than men and one of the reasons that they think is that livers between men and women are about the same size and since the fluid volume of the female tends to be smaller for the water volume, it is thought that having a smaller volume of water or fluid that is circulating through the liver over the same length of time and so it's broken down faster, it's just circulated through the liver faster in females.

Q. Okay. Now, Mr. Glover, are you familiar with a process where, when we are given a known alcohol concentration in a person's blood or in breath, but in this case in a known-- in a blood sample, that it's possible to calculate what the concentration would have been in that person's blood at an earlier point in time?

A. That is called retrograde extrapolation.

Q. If you would-- all right. Go ahead. What does that mean?

A. That means basically you take the concentration at a known time and as you go back in time for every hour you add a fixed amount of alcohol back to the concentration you determined.

Q. All right. And what is it that you need to know in order to make this calculation?

A. Well, there are published studies where these rates of elimination are available and you simply take the concentration at your in-point and you can-- you can pick a range of elimination rates and apply those to the concentration you had at the in point.

Q. And in this range is there some number that's in the middle of this range that is recognized in your field as--

A. There is a rate that we use in North Carolina that is considered to be a conservative and accepted rate in North Carolina.

Q. What is that rate that is used in North Carolina?

A. It's .0165 grams per hundred mills per hour.

Q. And at some point did I-- were you here for the testimony yesterday?

A. Yes, I was.

Q. And were you here when people testified as to-- testified as to the time that she-- that Ms. Marvin was at the surf shop?

A. I wasn't here for that testimony.

Q. Have I provided you with some information about when-- about testimony that was received or would be received of when it was believed Ms. Marvin stopped drinking prior to the collision at the intersection?

A. Was your question have you provided that?

Q. Yes?

A. Yes.

Q. And what was that information?

A. I believe that the consumption stopped about 2 o'clock, the crash was about 2:50. I think the first consumption started at noon.

Q. All right. And why is that time of when the final consumption, why is that important?

A. Well, when you consume it takes time because that pyloric valve is going to open and emit contents, you have to wait. You drink it, it is not immediately available to be absorbed by your blood. It takes some time. And so the fact that the last drink was about 2 o'clock, allows you to predict about the time that the peak alcohol concentration occurred.

Q. All right. And did you do some calculation in an effort to determine when you believe the peak alcohol concentration occurred in this case concerning Ms. Marvin?

A. Yes, I did.
Q. Do you have some diagram with you?
A. Yes, I do.
Q. Mr. Glover, let me hand you what's been marked--
THE COURT: Let me see it.

BY MR. TRIVETTE:
Q. Hand you what's been marked State's Exhibit 16, if you would, Mr. Glover, and ask you if you can identify it?
A. It's a BAC time curve that I constructed.
Q. And what did you-- you constructed it based on what?
A. I used the time that the alcohol consumption started, the time that it stopped, the number of drinks as I understood them that were consumed, the time of the crash and the time that the blood was drawn and then I used an elimination rate to-- or the retrograde extrapolation.
Q. In order to draw your curve?
A. Yes.
Q. Just so I'm clear, if you would, need to be clear about what information you relied on in forming that chart. Were you here for the testimony

of-- about the number of drinks consumed allegedly?

A. No, I wasn't.

Q. What did you use for that?

A. Two Margaritas and between twelve and one and three shots of 100 proof schnapps between one and two.

Q. And what was-- what information as to the time of the crash did you rely on?

A. I had a copy of the wreck report, I believe. I indicated 2:50 is the time. It may have been 2:51.

Q. And what was the-- what information did you rely on as far as when the blood was drawn from the defendant?

A. Used 7:25, which I had understood that was the time.

Q. And what information did you rely on, I think I have covered this, about when the last drinks were consumed in this particular case?

A. Information provided by you.

Q. And what time was that?

A. Would have been around 2 o'clock, I believe.

Q. If I ask you some questions, Mr. Glover, based upon the calculations that you did and the chart

there that you have-- the chart there that you have made, would that-- would that chart-- the calculations that you made about your retrograde extrapolation, would that chart assist you in illustrating your testimony to the injury?

A. I think it would.

MR. TRIVETTE: I'd move to admit it for illustrative purposes.

MR. SANDERS: Objection.

THE COURT: Voir dire?

MR. SANDERS: Yes, sir.

THE COURT: Ladies and gentlemen, there is a matter to which I must attend out of your presence. I'm going to ask that you step into the jury room and I will call for you momentarily. Do not discuss the case during this period of time.

(The jury panel was excluded from the courtroom.)

THE COURT: We are now outside the presence of the injury. Basis of the objection?

MR. SANDERS: Your Honor, the basis of the objection is that the State has not laid a proper foundation for this to come into

evidence as a scientifically reliable formula for extrapolating blood alcohol. There is no evidence-- I mean, he has given some formula that he says that he uses but there is no evidence that this is an accepted formula, this is something that is typically done. Also, I am in possession and I would like to ask him some questions about some information I have that I believe he based this formula or this chart on certain assumptions which may or may not be correct.

THE COURT: Do you want to cross him as to--

MR. SANDERS: Yes, sir.

THE COURT: As to his assumption?

MR. SANDERS: Yes, sir.

THE COURT: That would be the basis of his opinion?

MR. SANDERS: Yes, sir. But I would also say the State is yet to lay a proper foundation for the admission of this evidence and, of course, once that chart is shown to the jury, you know, cat is out of the bag at that point.

THE COURT: Any offer of proof-- not

ruling at this juncture but is there any offer of proof?

MR. TRIVETTE: I will be glad to ask him some more questions about the formula that he uses.

THE COURT: Proceed.

BY MR. TRIVETTE: (Voir dire)

Q. Mr. Glover, just explain when you are doing retrograde extrapolation, Mr. Glover, you start with a known quantity of alcohol at a known time, is that correct?

A. Correct.

Q. And then if I ask you, as I have in this case, to calculate for me an extrapolation back in time to a particular point, and in this case, of course, I have asked you to calculate back four and a half hours?

A. Correct.

Q. And in doing that calculation, what is--what is the formula or the co-efficient, if you will, whatever you call the .0165, what is that number based on?

A. Well, there are a number of studies that have been done where they have taken individuals, they

take a blood sample, they measure the alcohol concentration, they wait a period of time, typically an hour, they take another sample, they compare the concentrations and they calculate the difference between the two and that is the elimination rate.

Q. All right. And this-- these types of studies for-- for how long has this type of information been commonly accepted throughout the field that you are in?

A. Well, it was initially brought up, I am going to say in the-- in 1935, in that range, and the formula has been applied since that time. There are a lot more recent studies that have been done involving thousands of samples that have been published in journals that substantiate some of the early work.

Q. All right. And is this number-- you said there is a range but in North Carolina it's-- the number that you use or that is recognized is .0165? In the range that is recognized, is this number in the middle, is this a conservative number, is this a liberal number, what is it?

A. It's fairly conservative. There was an earlier case in North Carolina where this particular rate was accepted by the Court and that is one of the reasons that we use it.

Q. Is it also a number that-- in addition to this case that is recognized, it is also accepted as a conservative number in the field, in the literature?

A. Yes. In the studies I have looked at, about seven percent of the samples that they have looked at had rates that were slower than that, about 13 percent were right in that range and the rest of them were greater rates than that.

Q. Greater rates?

A. Yes.

Q. So this is in the bottom 20 percent as far as being a conservative rate, recognized rate in the literature?

A. Yes.

Q. And is this number that is-- in this formula, this retrograde extrapolation formula accepted in this field throughout the country and throughout the world?

A. Yes, it is.

Q. And some of the materials and the literature that you have researched have been international materials?

A. They have. Some of the instructors that I had classes under and that I consult with on a regular basis are the authors of the publications and

they are world recognized authorities in it.

MR. TRIVETTE: All right. That will be all I have.

THE COURT: Cross-examination?

BY MR. SANDERS: (Voir dire)

Q. As I understand it, you base your chart there on certain assumptions, one of them is that the defendant, Ms. Marvin, stopped drinking approximately 50 minutes prior to the collision?

A. Yes, as far as the peak is concerned.

Q. There was approximately four and a half hours from the time of the accident and the drawing of the blood?

A. Correct.

Q. A conservative elimination rate is 0.0165 BAC per hour?

A. Correct.

Q. And the defendant was fully absorbed at the time of the collision and was unable to consume any additional alcohol after the collision?

A. Correct.

Q. Is that correct?

A. Yes.

Q. Then your assumption on the fully

absorbed, what you mean is that, if I understood your testimony, is that all the alcohol has gone through now either the stomach wall or the small intestine and into the blood stream?

A. By that time, yes. That is based on the fact that my understanding is that there was no food consumed during the drinking. The majority of the drinking was-- if you look at the three hour window, from noon until the time of the crash, the majority of the drinking occurred in the first half of that with the last drink coming some place between 1:30 and 2:00, and that was small volume, high concentration alcohol drink.

Q. And how many ounces of alcohol did you figure into that?

A. Well, to calculate the ascending slope, I used-- the ascending slope does not influence the descending slope. The descending slope is calculated based on the blood results. It's the ascending slope that can be influenced by the amount of alcohol that she consumed but the descending is not dependant upon when she drank but-- it's that she consumed nothing after 2 o'clock. Regardless of when it was consumed, it was in there and the rate of elimination is going to be constant from that point on.

Q. Right. But the ascending slope on your chart there is dependant upon your calculation of the amount of alcohol consumed?

A. Its slope is tied back to the peak that I get when I do my retrograde. The angle of it is anchored in this case with noon because that was the time that, as I understood, the drinking started. If it started sooner than that, it wouldn't influence the descending.

Q. If the drinking started sooner than that?

A. Right.

Q. But--

A. It's when it stopped and when the blood draw was that have more importance than when the alcohol is consumed.

Q. And does everyone metabolize alcohol the same way?

A. They metabolize it the same way. They don't metabolize at the same rate.

Q. At the same rate? And can you study a person's body in order to determine how they metabolize alcohol?

A. No. You could take an individual and calculate an elimination rate for them today. If you did it tomorrow you might get the same, you might get

something slightly different. You will get the same-- there is a range. There will be variations according to what is going on with them at that time. Chronic abusers eliminate at a much greater rate. People at higher BAC's eliminate at a much greater rate. Females eliminate at a greater rate. So all of those things come into play.

Q. How about absorption?

A. Absorption is influenced--

Q. Is there any validity to there being some studies about differences in the absorption rates between men and women?

A. Right off the top of my head I don't recall any about the difference in absorption rate. Those again have variations. A lot of studies are done with-- where you fast, take one single dose of alcohol and then they start following the alcohol concentration. Again, there is some variation in there. Here, we are looking at a three-hour period. Most absorption is going to occur, generally speaking, half an hour to an hour and a half. Again, food in the stomach can slow it down some but in this case you have got three hours for absorption to occur and really almost an hour and a half after the last drink or an hour after the last drink, and that one is not

going to be as important with respect to the peak because you have elimination going on at the same time. As soon as the consumption starts, the elimination starts.

Q. Alcohol is constantly-- is it safe to say in the body it's typically-- it's going up or it's going down?

A. Well, it's doing both. Like a bathtub that you are pouring water in and the drain is open. Pour it in too fast, the tub is going to get full because it can only drain at a certain rate. Pour it in slower, it is going to empty. Pouring it in, pouring it out.

Q. Rarely stays at a constant in the body? It's usually going down faster than it's going up or vice versa?

A. Well, you know, there again, they have studies where they wanted to-- I don't recall what they were looking at but they measure the concentration, they have people hooked up to an IV and if you administer it at a certain rate-- if you administer it at the rate it's being metabolized, then it will level off and stay at the same level the whole time but they are eliminating and they are absorbing at the same time.

Q. And the amount-- the information you have provided, you have been provided concerning the amount of alcohol consumed which you base it on two Margaritas and three shots of 100-proof liquor?

A. I understood that to be what was consumed, yes. But again, it influences the shape of the ascending, not the ultimate peak. In this case, the ultimate peak is being determined by the elimination rate when you are going back.

MR. SANDERS: I don't have any other questions.

THE COURT: Anything further?

MR. TRIVETTE: No.

THE COURT: I think he's met the more stringent standard general acceptance but let me ask you just in the alternative, the method about which you have testified, first of all. Is that generally accepted in the field and among similar situated experts as a reliable scientific method?

THE WITNESS: Yes, sir, it is.

THE COURT: It's generally utilized within this field for the purposes in which you are utilizing it in this case?

THE WITNESS: In this case. There are

limitations and the fact that if you draw your line on back, on back, you can get back to the point where someone hadn't consumed anything and your line would say that there was something there. That is if you don't-- you can go too far back, but in this case we have good time points so it allows us to draw the line back on beyond the crash, actually.

THE COURT: And the-- the methodology is based on science and scientific knowledge?

THE WITNESS: Yes, sir.

THE COURT: And it is-- you have described for us variables or the variables are otherwise subject to description or disclosure, the variables that may be involved with this process?

THE WITNESS: Those variables--

THE COURT: Either you have described them or they are capable of being described and you are capable of describing those variables?

THE WITNESS: I think I already have.

THE COURT: My question is, have you described them or are they capable of being described?

THE WITNESS: I think I have described the variables, I'm sorry.

THE COURT: Next question, the information, methodology and the variables are subject to publication of some sort?

THE WITNESS: They have been published, yes, sir.

THE COURT: And are available for review by other persons in your field?

THE WITNESS: Yes, sir. I have copies of them with me.

THE COURT: And the-- there has been some test or verification of this methodology and of the variables?

THE WITNESS: Yes, sir.

THE COURT: All right. I don't have anything further. I do find that he is an expert, which there's been no contest to, and in the alternative I find that methodology about which he testifies is generally accepted, that it is generally accepted which is the higher standard, and I also find that it also meets the Dobear or Dobar (phonetically) standard.

Also find that otherwise the

information will be helpful to the jury, he is able to articulate he is an expert which has not been contested and therefore the other matters go to weight, not admissibility and are subject to cross-examination. Anything further?

MR. SANDERS: No, sir.

THE COURT: Bring our jurors back, please.

(The jury panel was returned to the courtroom.)

MR. TRIVETTE: Shall I proceed?

THE COURT: Yes, sir.

BY MR. TRIVETTE: (Direct examination)

Q. Mr. Glover, I asked you to take a look at what we had marked as State's Exhibit 16 and asked you if you could identify it and I believe you indicated you could?

A. Yes, it's BAC time curve that I constructed.

Q. Now, a BAC time curve, would you just explain-- well, let me ask you, if I ask you some questions about retrograde extrapolation, the process you have described earlier, of calculating back from a

known point and known quantity to an earlier time, would this chart assist you in explaining your answer of that question to the jury?

A. Yes, it would.

MR. TRIVETTE: Your Honor, I would move to admit it for illustrative purposes.

MR. SANDERS: Note my objection, Your Honor.

THE COURT: Well, is there some other basis other than that which you have already articulated?

MR. SANDERS: No, sir.

THE COURT: Then overruled on that basis.

(Received and marked as State's Exhibit 16, by the Court.)

BY MR. TRIVETTE:

Q. Mr. Glover, if you could, could you step down here just a second and bring with you State's Exhibit 16. I would ask you just to set it right here. And if you would, can you just explain what the information is on here and how you come to-- to show this BAC time curve?

A. On this ordinate we have got the alcohol

concentration that goes-- starting at zero, that time across the bottom. Noon was the time that the drinking started. The crash was at 2:50. I have marked it up here. The blood draw was at 7:25, indicated where the blood draw was here. The recorded concentration of alcohol at the-- that resulted from the blood draw was a .21, which would intersect at this point. When you take this-- the concentration at this point in time and you do a retrograde extrapolation, you add a certain amount of alcohol back to the value that you had here, you add it to it for every hour going back. So what I have done is I have--

Q. Try to turn this a little bit, sorry, Mr. Glover.

A. What I did is, I added that value back to this and drew a straight line. This is the time of the crash and this shows what the-- about what the concentration of alcohol would have been at the time of the crash.

Q. Now let me ask you, this part of your curve, from your known blood draw and your known amount backwards, is that based in any way on the information of how much she consumed?

A. No, it's not related to how much she

consumed. It's an average value, it's a conservative low value for the elimination of alcohol, and the drinking scenario here was calculated and plotted but it doesn't really matter what this portion of the curve, the shape or the slope of this line doesn't really matter. Since the drinking stopped at about 2 o'clock, that is one of the key times because there is no more alcohol going into her system to be absorbed. So at that point she is going to eliminate and you are going to have a steady state of elimination of alcohol until it's gone.

Q. Now you drew a peak in this curve?

A. Yes, I did.

Q. Now what did you base the peak on?

A. Well the peak is based on when the drinking stopped, by in large, and the fact that there was no food consumed during the drinking. The last alcohol that was consumed was a small volume, high concentration alcohol. And there is about-- that would take usually a shorter length of time to be absorbed so it allows you to predict about where the peak would be.

Q. So in your opinion based upon just the peak, not what her alcohol concentration was at the time of the crash but just based upon-- just the peak,

in your opinion, what was the time of her peak based upon the information testified to or provided as to the consumption and the time she stopped drinking?

A. Around 2:30.

Q. Around 2:30?

A. Prior to the crash.

Q. Hand you what's been marked as State's Exhibit 17, Mr. Glover. Could you please identify it, of course, for the record first?

A. It's a table that I constructed. It's more a numerical representation of the elimination that is in the blow-up there. It's just, I took the concentration from the blood draw at 7:25 and did the retrograde extrapolation but I put numbers on it.

Q. And if I ask you some questions about your calculations as to the retrograde extrapolation, would that chart assist you in illustrating your testimony to this jury?

A. Yes, it would.

MR. TRIVETTE: Your Honor, I move to admit State's Exhibit 17.

MR. SANDERS: Your Honor, I object, same grounds as State's Exhibit 16.

THE COURT: Overruled.

(Received and marked as State's Exhibit

17, by the Court.)

BY MR. TRIVETTE:

Q. If you would, if you would step down again, Mr. Glover. If you would, would you just explain, Mr. Glover, what the numbers here are on this chart?

A. I have got the crash time, the blood draw--

Q. Now the first column, this is time?

A. Time, and the blood alcohol concentration. It was a .21, I believe Agent Stark said, 213. I used 210.

Q. You rounded it down?

A. Because that is-- the truncated value is what you use. I started with the truncated value. It doesn't really change the final calculation. I added .0165 per hour going backwards. This time, actually I calculated the value at the time of the crash and then I just showed it decreasing because what you can see is that with each hour that passes, the alcohol concentration would have decreased by .0165 per hour and the last one is 35 minutes so there is not as much change from this reading to that.

Q. And your calculation indicated that at the

time of the crash at 2:50 p.m., in your opinion, what would have been the alcohol concentration in the defendant?

A. About a .28.

Q. This number here, this elimination rate, Mr. Glover, is that number recognized in your field as a conservative elimination rate?

A. Yes, it is.

Q. How conservative is it viewed?

A. About seven percent of the people would have a slower elimination rate. About, I believe it's about 13 percent or in that range, and the rest of the people eliminate at a faster rate.

Q. If you use a number that most of the experts in your field rely on, in other words, a faster elimination rate-- is that correct, is that true?

A. Faster elimination rate--

Q. Wait a minute. Do most experts recognize a number that calls for a faster elimination rate than the one you have used in this case?

A. Well, there is a faster rate, again, depending on gender and depending on alcohol concentration, amount of alcohol experience. A more accurate or more average value would be a faster rate.

Q. More average or accurate value would be a faster--

A. More average value.

Q. All right. And if you use a faster rate in calculating the retrograde extrapolation, what happens to this number at 2:50 p.m.?

A. It would go up.

Q. It would go even higher?

A. Yes, it would.

Q. Now what factors-- you said that-- you mentioned some other factors that can make the elimination rate faster in some people?

A. Yes.

Q. Now does gender affect the elimination rate?

A. Gender does affect.

Q. How?

A. Females tend to eliminate at a faster rate. They circulate more blood through their liver per unit time than males so there is a greater opportunity for the alcohol to be metabolized.

Q. Does drinking history affect the elimination rate?

A. Chronic abusers tend to have accelerated rates. When people get above the .30, they go into

another metabolic pathway that causes that rate to go up but that is, I would say rare, but those are for the chronic users.

Q. All right. And what about a higher BAC?

A. People at higher BAC's tend to--

Q. Is that blood alcohol concentration?

A. Yes. They tend to have a faster elimination rate also.

Q. So all those factors would increase this number that you got .285 at 2:50 in the afternoon?

A. Yes.

Q. Now Mr. Glover, is this calculation right here that you have done, this retrograde extrapolation, again, does it-- is it in any way dependent on knowing how much alcohol or the concentration of alcohol that the defendant allegedly had consumed?

A. No. It's based on the result from the blood draw at 7:25 and using the elimination rate.

Q. And does this number in any way-- does tolerance affect this? I guess that is the same-- does tolerance change the elimination rate?

A. No. Tolerance wouldn't be--

MR. TRIVETTE: All right. Thank you. You can have a seat back up there. Thank you, Mr.

Glover. I don't have anymore questions.

THE COURT: Cross-examination?

MR. SANDERS: Yes, sir.

CROSS-EXAMINATION

BY MR. SANDERS:

Q. Mr. Glover, first of all, your calculations as you have recited them to the jury are based on certain assumptions, are they not?

A. It's based on research that has-- published research where people have looked at elimination rates. It is based on that.

Q. But for purposes of this case, it is based on certain assumptions?

A. Well, the alcohol concentration at the time of the blood draw is not an assumption. That is, I think, a fact in the case and I use that fact plus an elimination rate.

Q. But it could be an assumption because you are assuming the integrity of that blood sample, am I right?

A. Okay.

Q. Do you agree?

A. Oh, if you are saying-- I am accepting

that blood-- that concentration as being correct.

Q. And you are assuming that the-- that Missy had her last drink approximately 50 minutes prior to the collision?

A. That would-- that could shift the peak but it would not shift the rate. It would not shift the elimination rate. It would shift the peak some.

Q. You are assuming that there were approximately four and a half hours from the time of the accident until the blood was drawn?

A. I believe the times show that that is the time.

Q. And you are using your-- what you call your conservative elimination rate?

A. Yes, I am.

Q. And you are assuming that Missy was fully absorbed?

A. Again, based on the drinking scenario as I understand it, my opinion is that she was fully absorbed, so, yes.

Q. And that opinion is based on your assumption that she had not had anything to eat?

A. It's based on the drinking scenario.

Q. Well, weren't you told by the District Attorney's Office-- they are the ones that gave you

this information and weren't you told that she hadn't had anything to eat?

A. That is what I understood, that she had not had anything to eat.

Q. And you yourself have never examined or been privy to any examinations of Missy Marvin?

A. No, I have not.

Q. Of her person?

A. No, I have not.

Q. Of her body's manner of metabolizing alcohol?

A. Well, I have never heard of any-- I have only understood one way that alcohol is metabolized.

Q. I'm sorry, I said that wrong. It's metabolized by human beings in the same way?

A. Yes, it is.

Q. But at different rates?

A. At different rates. But again, there are ranges for those rates with thousands of subjects that have been examined.

Q. But it does vary?

A. It certainly varies.

Q. And you said women tend to eliminate at a higher rate?

A. Yes, they do.

Q. They tend to, that is not an absolute, for example?

A. No, it's not.

Q. And as to the alcohol concentration which you say based on your formula at the time of the accident would have been a .285?

A. Yes.

Q. That would also assume what you call the peak, the highest alcohol concentration at about 2:30?

A. Well, the 285 is based on the-- drawing the blue line back. The peak could shift some, if you are wanting to suggest that she wasn't fully absorbed at the time of the crash.

Q. I am not suggesting anything, just asking you because I thought I understood that chart, not the one that is shown to the jury but the one that's behind it, I thought that your peak as you drew it on that chart was at about 2:30, is that correct?

A. Correct.

Q. And do you know how many drinks a .213 is the equivalent of?

A. I would need to know the weight of an individual and volume distribution and we use averages as far as volume of distribution for males and females. But you can calculate the amount of alcohol

in a subject then but again it is a calculation, not a measurement.

Q. Did the District Attorney's Office provide you with any calculations or any sizes of Ms. Marvin?

A. I understood her weight, and I don't recall where I found her weight, but again, her weight would not have influenced the elimination rate. Her weight would influence the absolute amount of alcohol that it would take to get to a particular alcohol concentration. But when you are taking the concentration at the blood draw, doing the retrograde extrapolation, her weight doesn't matter.

Q. And you based, I think you told the jury, you based your calculations on the assumption that she had two Margaritas and three shots of a 100-proof liquor?

A. That is-- again, the ascending or black portion of the curve, the shape of it is affected by the timing and the concentration. The peak was derived by doing the retrograde extrapolation.

Q. And in your opinion, those five drinks would take her to a .285?

A. If those-- I don't know and I don't know that it has been testified to, the exact amount of alcohol that was consumed at that time.

Q. And so then naturally, you don't know the exact amount of alcohol?

A. No, I don't. I don't know.

Q. All right.

MR. SANDERS: Thank you. That is all the questions I have.

THE COURT: Redirect?

REDIRECT EXAMINATION

BY MR. TRIVETTE:

Q. Mr. Glover, again, does the amount of alcohol in the drinks or the number of drinks or her weight, do any of those factors affect your calculation of retrograde extrapolation working from 7:25 p.m. on the 6th of April at a .210, to calculate back to the time of 2:50 p.m. and the result that you got?

A. Does not matter.

Q. Does not matter at all?

A. At all.

Q. And are you confident, sir, based upon your training and experience and information in the field that you work in, of your calculation of a .285 at 2:50 p.m.?

A. Ask your question again.

Q. Are you confident of the result?

A. Yes, I am confident.

MR. TRIVETTE: Thank you. That is all I have.

THE COURT: Recross.

MR. SANDERS: No, thank you.

THE COURT: You may step down. Counsel approach.

(Whereupon an off-the-record discussion was held.)

THE COURT: Ladies and gentlemen, it's an appropriate time for us to take an afternoon recess. As I indicated and forewarned you yesterday, it might be a bit necessary to go a bit further today. Before we go much past 5 o'clock, however, I will make additional inquiry of you but at this time I will ask you to take a ten-minute recess. In ten minutes, please come back in and take the same seats you now occupy and we'll resume with the dispatch of this case.

All right. We are in recess.

(Whereupon the trial recessed. After recess, the trial continued as follows:)