IN THE COURT OF CLAIMS OF OHIO

PORTAGE COUNTY, OHIO

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JASON WOLGAMOTT, et al.,
Plaintiffs,
vs.
E.R. TRUCKING, INC., et al.,
Defendants & Third-Party Plaintiffs,
vs.
ODOT, et al.,
Third-Party Defendants.

No. 97-03611-PR

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Deposition of JO ELLIS DAVIDSON, a Witness herein, called by the Third-Party Defendants for cross-examination pursuant to the Rules of Civil Procedure, taken before me, the undersigned, Melissa Karm, a Stenographic Reporter and Notary Public in and for the State of Ohio, at the offices of Black, McCuskey, Souers & Arbaugh, 1000 United Bank Building, 220 Market Avenue South, Canton, Ohio, at 5:00, p.m., on Monday, the 22nd day of December, 1997.

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APPEARANCES:

On behalf of the Plaintiffs:

Young & McDowall

By: Dean A. Young, Attorney at Law
507 Canton Road
Akron, Ohio 44312

On behalf of the Defendant & Third-Party Plaintiffs:

Black, McCuskey, Souers & Arbaugh

By: Robert E. Soles, Attorney at Law
Gust Callas, Attorney at Law
1000 United Bank Plaza
Canton, Ohio 44702

On behalf of the Third-Party Defendants:

Ohio Attorney General's Office

By: Gregg H. Bachmann, Assistant Attorney General
65 East State Street
Suite 1630
Columbus, Ohio 43215

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MR. SOLES: Gregg Bachmann is here to take the deposition of Jo Davidson who's our expert witness in this case. I believe Jo is J-o versus J-o-e, so that you know.

It's my understanding, Mr. Bachmann, that upon submittal of an invoice that you were provided, you are to see that that's paid within the allotted time frame that the State of Ohio allows; is that correct?

MR. BACHMANN: I'm not going to answer your questions, Bob.

MR. DAVIDSON: Then Mr. Davidson is not going to be deposed today.

MR. BACHMANN: It's noted, Mr. Davidson, that you submitted an invoice.

THE WITNESS: I took the liberty of drawing one up. If you have strong objection --

MR. SOLES: We'd like to have you look at it now that you are basically going to submit this invoice for payment for Mr. Davidson's time to come here today to testify. If this isn't submitted, there is no reason to even go forward.

MR. BACHMANN: I will submit it. We will take care of it. I don't cut the checks, Bob.

MR. DAVIDSON: I basically just want to know

that you are going to submit it for payment, as long as you don't have any objection or feel that it's unreasonable or out of line.

MR. BACHMANN: I'll submit it. Now it does say here you do have a specified number of hours for the time of the deposition. If that changes then the amounts will change obviously, right?

THE WITNESS: Yeah. We're starting at -- let's call it 5:00.

MR. SOLES: I just want to make sure there is no objection to the payment of his invoice.

MR. DAVIDSON: I'm not trying to be difficult. I want to be fair.

MR. BACHMANN: So do we. I appreciate your being straightforward actually.

JO ELLIS DAVIDSON

of lawful age, a Witness herein, having been first duly sworn as hereinafter certified, deposed and testified as follows:

CROSS-EXAMINATION

By Mr. Bachmann:

Q Please state your full name for the record.

A Jo, J-o, Ellis, E-l-l-i-s, Davidson, D-a-v-i-d-s-o-n.

Q Mr. Davidson, what is your address?

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A 5421 Normlee Place, Pittsburgh, Pennsylvania 15217.
Q Mr. Davidson, did you bring any documents with you today? Can you just tell me what you brought in this packet.
A Photocopies of photographs of the accident scene; the roadway taken at various times after the accident; copies of the earlier version of Sgt. Veppert's report. He's expanded it. I've been given a copy. We're kind of looking at it.
There is a copy of Mr. Daecher's report; complaints; some notes on research that I did on skid testing on a concrete surface with excess tar at the surface; calculations I did; a copy of my report; the Ohio State Highway Patrol accident investigation report.
Q Is that all the documents you were given to review? Are they all in this packet?
A Up to today. Sgt. Veppert's drawings and his expanded report and his notes, I just got today. Everything I had when I left town this morning is in the file.
Q Is there a copy of your contract? Do you have a contract?
A No. I just have an oral agreement.
Q With Black, McCuskey?
A Mr. Soles on behalf of Black, McCuskey.

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Q Correspondence that Mr. --
A Yeah, sure. There were some letters back and forth.
Q This is your complete file in other words?
A Yeah, except for the material I got today.
Q What I'll do is I'll take a moment and just flip through it if that's all right with you?
A Yes. There a number of copies of my resume. I didn't know how many people were going to be here, so I got five copies.
MR. CALLAS: Off the record.
(Thereupon, a discussion was held off the record.)
MR. BACHMANN: Mr. Davidson, my name is Gregg Bachmann. I'm an assistant attorney general representing ODOT in this Wolgamott litigation. I'm here to take your deposition by agreement of the parties.
If I ask you a question and you don't understand what it is that I have asked or if you feel I've mischaracterized or misquoted or somehow misrepresented or misstated something, or if you just don't understand what I've asked, do you promise to ask me to restate or rephrase the question?
THE WITNESS: Certainly.

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MR. BACHMANN: Thank you. You've had your deposition taken before?
THE WITNESS: Yes, sir.
MR. BACHMANN: So you know you've got to keep your voice up and respond verbally?
THE WITNESS: Yes.
By Mr. Bachmann:
Q How many times have you had your deposition taken before?
A 100.
Q What is it that you do for a living?
A I work as a consultant in forensic automotive mechanics. In other words, I investigate incidences involving motor vehicles and apply technical and scientific knowledge to try to determine what occurred and why, if it's possible.
Q Are you employed by or are your services engaged by attorneys?
A Sometimes, yes.
Q By who else?
A Insurance companies, occasionally by police departments.
Q You have testified as an expert before?
A Yes.
Q For what police departments have you testified as an

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expert?
A Well actually it wouldn't be for the police department. It would be for the County of Allegheny or the County of Blair or the Commonwealth of Pennsylvania, something like that.
Q When they have been sued?
A Usually in criminal cases where I would act as a reconstructionist for the prosecution.
Q How many times have you done that?
A Ten or twelve or fifteen. I'm not exactly sure.
Q How many years have you been engaged in this business?
A Going on 29.
Q Do you do most of your work for plaintiffs, defendants or does it not matter?
A It has no meaning whatsoever to me. I don't even try to sort the cases that way. My impression would be something around 50/50 or 60/40. I don't count them that way.
Q Mr. Soles engaged you in this?
A Yes.
Q What were you asked to do?
A Look at the material and see what I could tell him.
Q Did he give you a mission in particular saying, "We want you to look at this aspect of it or this aspect of

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it"?
A No. I don't look at stuff that I don't feel personally that I'm qualified to do. It's my decision, not his. You know, I probably gave him the third degree over the telephone about what his case involved, what material was available and send me what you got and let me see what I can tell you about it.
Q He didn't say, "I want you to specifically look at the brakes"?
A Well that was a question. You know, "Can you tell me what this means. Can you explain to me what it means that they measured the brake strokes," and so forth.
Q What else did he ask you to look at in particular like that?
A The whole accident situation, what I can tell him.
Q Were you asked to reconstruct the accident?
A Not specifically, because I can't tell him until I see the material whether there is enough to work with to do a reconstruction.
Q Have you reconstructed the accident?
A Not really, no.
Q What is it that you have done?
A Determined that you really can't do a reconstruction. That's as succinct as I can be.
(Thereupon, Davidson Exhibit A was marked for purposes of identification.)
By Mr. Bachmann:
Q I'm handing you what has been marked as Davidson Exhibit A.
Can you tell me what that is.
A Yeah. It's a copy of the report that I submitted to Mr. Soles.
Q You said that you couldn't really -- well let me ask you this before we get too much further into it.
Have you read any materials other than what's set forth in this report?
A In reference to what?
Q In preparation -- well let me break it down.
In creating your report, did you review any other materials?
A Yes.
Q What else did you review?
A Hundreds of articles. I have a fairly extensive library and I went through everything that had anything to do with truck brakes at all or coefficient of friction or skid testing or anything like that. I went through all that material again.
Q So you read articles on brakes and the coefficience of friction?
A Skid testing.

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Q What else?
A Texts on traffic accident reconstruction.
Q What else?
A That pretty much covers it.
Q So other than the articles that you reviewed and the items that are listed in Davidson Exhibit A, did you review anything in preparation for this report?
A Yeah. I looked back through my data base at some old cases that involved bituminous concrete surface where there was excess tar at the surface and tried to get whatever information from those files that might be applicable or of interest or anything to this particular case although none of them involved heavy trucks.
Q Were there any drafts or preliminary matters to this report?
A I write on a word processor and saved the disk. Every time I bring it up I rewrite it or revise it or shorten it or lengthen it or do something with it, but I don't bother to save all of that. I save the finished product, which you have in your hand as Exhibit A.
Q Is this the only product that you sent to Mr. Soles in terms of a report?
A Yes.
Q Have you reviewed anything subsequent to Davidson Exhibit A?

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A Yeah.
Q What have you reviewed?
A I dug out an article on setting speed limits in curves.
I dug out an article on determining the speed of a heavy duty vehicle with hopping suspension during brake application and determining its speed from the spacing of the skip skids. Lord, I don't know what else. You know, I don't just stop. I have a tendency to keep going.
Q Have you been provided with any depositions or any statements or other documents relating to the facts of this case?
A What you see there plus what I was given today, which is Sgt. Veppert's expanded report and his drawings and photocopies of his field notes.
Q Okay.
Have you read Mr. Ruegg's deposition?
A No.
Q You haven't read any of the depositions?
A No.
Q You did have a conversation with Mr. Ruegg though, correct?
A Yes, I did.
Q Did you have a telephone conversation?
A Yes.

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Q Did you call him up or did he call you up?
A No. Mr. Soles called me and had Mr. and Mrs. Ruegg in his office and we had a conversation on the speakerphone.
Q Was that the only --
A That's the only contact. I met him this afternoon to say, "Hello. How are you? I hope you're fine."
I have never spoken to them otherwise.
Q What was the purpose of that call?
A I wanted to see, among other things, what he could tell me about what he did during the course of this accident in terms of brake applications and so forth.
There was a question of whether I could determine the road speed of the vehicle from the engine speed, the gear in which the transmission was placed and rear axle ratio and tire size. I said yes and he was able to give me the information for his tractor.
I contacted a friend who has the transmission manuals and got the ratios for gears and did that calculation and put it in the report.
Q What else did you discuss?
A That's about the size of it. We also talked about what he recalled doing during the course of the accident.
Q Can you tell me what he said?
A He came around the curve. He realized that the

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traffic was stopped. It was backed up further than he -- he doesn't drive that road frequently. He hadn't driven it for perhaps a month prior to the date of the accident. He came around the curve. He was in ninth gear. His engine was running against the Jake Brake at about 1,800 to 2,000 RPIs. He saw the van much further back than his recollection of traffic backing up from the railroad crossing. He hit the brakes. His trailer started to hop. He was afraid he was going to lose control. He wanted to go to the right and go off the road on the right. He saw a Pontiac start to pull out to the right, so he released the brake, steered left reapplied the brakes, then collided with the van.
I paged through my report and in the last full paragraph I tried to summarize what he had told me.
Q Did he tell you anything else at all which you can recall?
A He was going home, I think, which was not a road he usually used, but he wanted to stop at home. I don't know. It was something to that effect.
He went back several days later and it looked like the tire marks from his tractor/trailer and from Mr. Skidmore's tractor/trailer were almost gone. He thought that was pretty strange.
Q What seemed strange about that?

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A That the skidmarks were disappearing and that they usually don't.
Q Mr. Ruegg was saying that?
A No. Yeah. Well that was his experience, into that if you put skidmarks on blacktop paving, they tend to stay there for a long time.
Q Why did you say they usually don't disappear?
A They don't. They just plain don't. They stay there for months except the part of them that's right in the wheel tracks. That will be erased in a reasonably short time. But where they diverge from the wheel tracks where the traffic normally runs, they will last for months and months.
Q Do you know if there is a reason why they didn't remain that long?
A I have my conclusion.
Q What is your conclusion?
A That that surface had excess tar and that they weren't full normal skidmarks.
Q How did you arrive at that conclusion?
A Primarily from the photographs of the accident scene. Not the ones taken later, but the ones that were taken right there with the vehicles still in their final positions.
Q Show me which photos show the excess tar.

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A Well they don't show excess tar. They show some tar on the surface of the tire treads of what I interpret to be and somebody else may disagree.
Here's a photograph that shows the left rear drive axle tires of the tractor. In my experience, what I'm looking at on that tread surface is tar. They are not just clean. They are tar coated. The only place they pick up tar is off the pavement surface. It's not a freak of the photo copying, because I looked at the original prints that Sgt. Veppert brought with him. That's why I wanted to look at the original prints.
Here's another one that shows the same thing. Here's another one that shows the right rear drive axle tires and they show the same thing.
Then looking at the tire marks -- for example, this photograph taken looking toward the rear of Mr. Ruegg's trailer in its final position, that photograph has full black values in it and yet those skidmarks that should be as black as anything else are not. They are kind of a washed-out gray. They should show up black as pitch.
Q Where is the washed-out gray?
A The tire marks. All the tire marks. They are just washed-out gray. They are not showing up full black. I mean the tractor/trailer is supposed to have been skidding for over a hundred feet before the marks appear

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in that photograph and the tires are throwing up smoke. They are not ironing the surface like they normally do. Tire marks, in my experience, should show up just as black as the shadow under the trailer.
Q What do you attribute this to?
A Excess tar on the surface. When it's floating on the tar, it's not really melting it and ironing it the way a skidding tire will. It's just floating on the tar.
Q Why would there be excess tar?
A Why would there be?
Q Yes, sir.
A It's a new surface. It's a hot summer day. I don't know.
Q Do you know when the road had been resurfaced?
A I don't recall. Several weeks prior to this.
Q In your experience, how long does this excess tar condition last?
A I don't really know. I am not one to see how long it stays that way. I guess until it's picked up enough dirt and so forth to lose that characteristic.
Q Are you an expert at all in roadway construction or asphalt composition?
A No. I don't prepare myself to be.
Q When were you engaged by Mr. Soles?
A The 7th of March, 1997.

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Q Did you have an opportunity to inspect the truck that was in the accident?
A No.
Q Did you get a sample from the tires at all?
A No.
Q So your conclusion that the surface had excess tar comes from three sources:
One, Mr. Ruegg saying that the tire marks weren't there a couple days afterwards.
Two is by the photographs, by looking at the photographs that show the drive axles of the trailer or of the tractor that there was tar on the tires.
Three, that the skidmarks are somewhat grayish and not pitch black.
A Yes. I rely more heavily on the photographs than Mr. Ruegg's statement.
Q What did you mean when you said that they weren't full, normal skidmarks?
A My experience of heavy-duty truck tire skidmarks, passenger cars, light trucks, medium trucks, anything on rubber tires that skids for any appreciable distance -- let's say more than 20 feet on concrete surfaces -- leave very black, very durable skidmarks. They really alter the surface permanently and they show up in photographs as black. I mean blacker than the

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pavement surface. It's like running a hot iron over starch. It changes the surface. It's a permanent change. These don't look that way. They don't look black. The contrast values are in all the photographs. They are full black values in every one of these photographs and yet the tire marks on the pavement from both the tractor/trailers, both Ruegg's and Skidmore's, don't show up black. They look washed-out gray.
Q Do you know what the chemical composition of the asphalt was?
A No.
Q You don't get into that? That's not your area of expertise, right?
A No.
Q Is there anything else that Mr. Ruegg told you or did you keep notes of the conversation?
A I made notes as I talked to him. When I wrote the report I discarded them.
Q Is there anything else that came up in the course of conversation with Mr. Ruegg?
A He said something about oily stuff on the surface, but I didn't quite know what to make of it. I didn't pay too much attention to it. I relied on what I saw primarily in the photographs.
Q Oil on the surface of the roadway could have been in

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this photograph? The one that you showed me?
A Yeah. It's very rarely delineated between the trailer and the side wall. It's so sharply black on the treads of the tires that the only time I've ever seen that is when they track through tar.
Q Do you know in looking at this photograph here -- it's the photograph of the minivan with the jackknifed tractor/trailer right next to it. It looks like the surface of the pavement is wet.
Do you know what that fluid is?
A I don't know whether it's wet or just in deep shadow, because there is a sharp delineation back here. It may be just a function of being in full shadow. That's what I would interpret it to be. I know that there was some spill. I think Mr. Ruegg said something about he was losing oil from his hoist or something. He tried to shut off the oil. I don't know whether he was successful or not.
Q Now looking at this same photograph, you see the tires on the far side there?
A Not really well, but yeah, you can see a little bit of the tops of them.
Q Is that same delineation there as well?
A No. But they show up in the other photograph I think. Yes, in this photograph. (Indicating.) The one

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I'm holding in my right hand are the right drive axle tires of the tractor. The one -- wait a minute. I'm backwards. The one I'm holding in my left hand is the photograph of the right drive axle tires.
Q Okay.
A The difference is in the way the light is hitting them, the ambient light.
Q How long did this conversation last with Mr. Ruegg?
A Ten or twenty minutes. I don't know.
Q So really the substance of your conversation was him describing how he came around the curve. There was traffic stopped and backed up. He was traveling at the speed of 1,800 to 2,000 RPIs in ninth gear. He saw the van. The trailer began to hop. He wanted to go right.
A Well first he applied the brakes then the trailer began to hop.
Q He wanted to go right. There was a white car to the right.
A Well the white car started to go to the right. He released the brakes and steered left and came down again. By that time, he hit the van.
Q When you were first describing what Mr. Ruegg had told you, you said that he had seen the van much further back.
What did you mean by that?

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A His impression was that the van was way further back from the railroad crossing than his experience of traffic stopped for the railroad crossing had been. That's essentially what he was saying.
Q In other words, he was saying there was more traffic than he had seen?
A There were more cars stacked up with more space between them. The van was further back than he expected to see any kind of traffic backed up from the railway crossing.
Q What specifications for the tractor/trailer did Mr. Ruegg furnish?
A Model number of the transmission; final drive ratio of the drive axles; tire size; the engine RPMs; and the gear he was in at the time.
Q Do you know what the design capacity of the trailer was in terms of load-carrying capacity?
A I haven't worked that out. I don't know.
Q That wasn't in what he provided you?
A The trailer was empty.
Q But do you know what its load-carrying capacity was?
A No.
Q Do you know what he hauled in his rig?
A Apparently he had been hauling crushed stone for a period before the accident.

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Q Do you know how often Mr. Ruegg adjusted his brakes?
A No.
Q Do you know when the last time it was that they were adjusted?
A No.
Q Do you know if the vehicle had been taken out of service in the year prior to the accident?
A I believe it had been. I don't recall specifically, but I believe it had been.
Q Did you review Mr. Ruegg's maintenance records?
A Not really.
Q On Page 2 of 5 in Davidson Exhibit A, in the last full paragraph -- I'm looking at the last line.
It says: "Both reconstructionists cited above assumed that the brakes of the HDVC were held applied from beginning to end and were not aware of any period of brake release, whether full or partial, which assumption makes their calculated values of the initial speed of the Ruegg HDVC too high."
Can you explain that to me.
A Just exactly what it says. If they assumed that Mr. Ruegg put the brake pedal down fully and held it there until the tractor/trailer stopped moving in its final position -- and, in fact, he had not -- then their estimates of speed will automatically be too high.

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Q What proof do you have that the brakes were not applied continuously from beginning to end?
A Well first of all the trailer tires weren't on the ground all the time. Let's start with that. If we look at the photographs taken at the scene, for example this one or this one, either one that I'm holding up, they show views of the rear of the Ruegg semi-trailer. (Indicating.) You can see where his rear tires are on the ground.
If you can show me dual tire skidmarks leading right up to those tires, I'll throw myself out the window. I'll be real straight.
Q You lost me now.
A Look at the rear tires of the trailer.
Q Tell me what it is that you see.
A Well I don't see any skidmarks going up to those tires.
Q Okay. What are --
A I don't think anybody else can see any skidmarks going up to those tires, which means that the trailer tires were not skidding on the ground when the vehicle went to its final position. Therefore, the assumption that the brakes were held fully applied and the tires were skidding on the ground from the beginning to the end is wrong, pure and simple. It's wrong.

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Q Do you know how long his foot would have been off the brakes? Can you tell from this?
A I can't tell you whether his foot was on the brakes or off the brakes, but I can tell you that those tires were not skidding on the ground. That's what I can tell you. Anybody can see in these photographs that those tires were not skidding on the ground for the last guesstimate of 15 feet or 20 feet. I don't know. I don't have a scale in the photograph to tell me. You can't really estimate the distance from a photograph, the longitude and distance. They are very hard to do. But they very definitely -- the tires weren't locked up and skidding right up to the final position of the trailer.
In fact, in those photographs you can see that the right trailer tires were bouncing rather violently on the pavement while the left trailer tires -- well, I'm sorry. The left trailer tires don't seem to be touching it at all. You see a series of hot marks, of short wide skids leading diagonally up toward the right rear wheels of the trailer in its final position.
Q Do you know what those were from, those short hot marks?
A Yeah. That is from the trailer. The right rear trailer tires bouncing off the pavement.
Q What about these other skidmarks that we see?

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A Those would appear to be from the tractor, from the steer axle and drive axle tires of the tractor. Plus probably by that time the van is more or less broadsided on the road and is being pushed down the road by the tractor/trailer and it's most probable that its left side front and rear tires were leaving skid marks down the road.
Q I'm looking at a photograph --
MR. BACHMANN: Gust, do you have extra copies of photos?
By Mr. Bachmann:
Q Show me the other photographs you were relying on.
A Do you want all of them?
Q Yes. Let's just get the ones that we've been talking about.
A Here.
(Thereupon, Davidson Exhibits B through H were marked for purposes of identification.)
By Mr. Bachmann:
Q I'm handing you what has been marked as Davidson Exhibit B.
In that photograph you said that there were some hopping marks.
A I'd call them bouncing marks right there. (Indicating.)

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Q Those bouncing marks are from Mr. Ruegg's truck?
A That is my conclusion. That is my interpretation.
Q Do you know if they are from -- how many axles are there on that rig? Five axles?
A Five.
Q Which axle would those be from?
A I would say they are four and five.
Q Then over to the right you've got a series of dual skidmarks.
A Well you've got a whole series of marks to the right of them. You've got maybe six in there.
Q What are those skidmarks from?
A Well some of them are from the tractor because you can see that they loop up forward of the trailer, so they are definitely not the trailer. There is a lot of overloading where they widen out. That means downloading and making the tires jut out.
Q Heavy braking force?
A No. Vertical force and downloading are making the tires spread. That's not from braking. That's from vertical load. This has to do -- I think my interpretation would be that this has to do with the jackknifing, the element of jackknifing.
There are also some tire marks over to the left from them and I think one of them probably may be from the

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other tractor/trailer. I don't know. One kind of overlaps then runs under the center of the trailer. It's pretty hard to sort -- the time to sort this all out was when both tractor/trailers and the van were sitting there in their final positions and you can start from wheel positions and trace the skidmark back to the tire marks and start from the next wheel position and track them back and separate them out as to which tire mark is coming from which vehicle.
Q Are those marked here? These are the ones that we have marked. Let's refer to those.
A In what has been marked as Exhibit D I can show you exactly where the Skidmore tractor/trailer stopped.
Q Okay.
A Its trailer wheels -- the leading axle of its trailer here to the right and here for the left (Indicating.) The leading drive axle of the tractor on the right side here to the left area where there are a whole bunch of other tire marks. The steering axle right and left over here. (Indicating.)
Q Okay.
So the furthest skidmark to the left of Photograph D, does that correspond to a skidmark on Photograph B?
A No. The two you see here that are just to the left of the hot marks, they are the two that are inward of the

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left rear tires of the semi-trailer.
Q Those are from --
A I'm not sure exactly what they are from. I think they are from the tractor, from the Ruegg tractor. Then you've got another one that's way outside here. (Indicating.) I don't know what that is. That may be the van as it's coming around, rotating.
Q So let's go back to B.
In B at least you can say that all the skidmarks you see there are from Mr. Ruegg's tractor/trailer rig?
A Well I'm not sure any of them are skidmarks.
MR. CALLAS: Objection.
THE WITNESS: They are tire marks, but I'm not sure if we're talking about skidmarks or scuffmarks. When a tire is turned relative to the direction that it's moving, it will make a mark. It's called a scuffmark. I can't tell whether these are scuffmarks or skidmarks.
By Mr. Bachmann:
Q Are they all from Mr. Ruegg's vehicle?
A No.
Q Which ones are from his and which ones aren't?
A I can't tell exactly because there are some tire marks from the van. There have to be some with the van mixed in there that I can't sort out, because I can't see

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enough to be absolutely certain.
Some of them are from the hop or the bounce marks, these big bounce marks. I say they are bounce marks because they are wide. They are at wide intervals. I interpret them from the right rear trailer suspension tires. I don't see anything from the left side trailer tires in that area, as if the left side of the trailer is up in the air and it's bouncing on its right trailer wheel tires.
Q What would account for those hot marks?
A Trailers bouncing up in the air pretty violently, bang, bang, bang.
Q Why is it bouncing like that?
A Because the rig has gone into jackknifing.
Q So the bouncing that we see in Photograph B is not as a result of the braking?
A Not trailer hopping from braking, but from bouncing.
Q From the jackknife?
A From the jackknife and the collision and those forces. It's not a trailer hop.
If you want to see trailer hop, you have to go back to Exhibit F. In Exhibit F you can see a pair of hopping trailer tires, then a third hopping tire on the left. On the right you can see a hopping tire. They are closely spaced. They are right in a line and that's what trailer

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hop looks like.
Q What is that trailer hop in Photograph F? Is that from Mr. Ruegg's vehicle?
A I can't tell you. I cannot actually tell you because I can't track them down. The photos just aren't good enough for us to be able to track them down.
Q Assuming it was from Mr. Ruegg's vehicle, what would cause that trailer hop?
A Braking hard on an empty trailer and the trailer suspension gets excited harmonically and it starts to hop.
Q Mr. Ruegg had told you over the telephone that his trailer hopped --
A Yes.
Q -- when he initially applied his brakes?
A He applied his brakes and then the trailer started to hop. I don't know whether he intended for me to understand that it immediately started to hop or it braked and then started to hop. He wasn't clear.
Q Is this a result of normal braking or panic braking?
A Hard braking.
Q Is it a normal condition? Is trailer hop normal or abnormal?
MR. CALLAS: Objection. Go ahead.
THE WITNESS: It's normal. On an empty

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trailer, they are going to hop. It happens fairly frequently even at fairly low speeds. I've been behind I don't know how many trailers and watched them hop and heard them hop and bang their suspension, bang, bang, bang.
By Mr. Bachmann:
Q So it could happen on an ordinary braking or on a hard braking?
A It's usually under fairly hard braking. It's not common under real easy braking.
Q We've done B and F. Let's just go through the photographs that we haven't.
I'm handing you what has been marked as Davidson Exhibit C. It's another photograph.
A It's very similar to one of the earlier ones, but it's just taken a little closer. If you look at B, C was taken a little closer to the rear of the trailer than B. In B you can see full hot marks. I'll call them bounce marks.
In Exhibit C, the fourth one is cut in half at the edge of the frame. It's the same view, but it's just taken from slightly different distances. Exhibit B was taken from a point absolutely further away from the tractor -- from the trailer.
MR. CALLAS: Assuming that it's the same length

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of the lens.
THE WITNESS: Yeah. Well things look in pretty good proportion. I'm satisfied that they are not using a different lens.
By Mr. Bachmann:
Q I'm handing you what has been marked as Davidson Exhibit E. Tell me what that is.
A That's taken even further back. This is Exhibit E. That's the one where you can see exactly where the Skidmore tractor and trailer came to a stop in front of the Skidmore tractor, which was within a car length of the rear of the Ruegg semi-trailer. It was that close.
Q How did you get that car length measurement?
A Well you've got a police car parked alongside over in the other lane. You kind of guesstimate what the front end of it is. It is about even with the back end of the trailer. The rear end of the Reese car is about even with the steering axle skidmarks from Skidmore's trailer end, so I say it's within a car length.
Q Okay.
A That, of course, is a fairly full-sized car. I'd call it 16 feet.
Q Exhibit G. We had talked about that earlier, I believe.
A Right. This shows particularly the right rear outer

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dual tire on the tractor with surface tread. Surface, which to me, says tar.
Q Exhibits H?
A Exhibit H shows the tread surfaces of the left rear drive axle tires of the tractor. Again they exhibit the very clean black shiny surface which to me says tar.
Q Those are the ones we were talking about earlier, correct?
A Yes, that's correct.
Q And going back to Exhibit A, your report, and Page 2 of the last paragraph, what in -- we've just gone through these photographs. Now perhaps you can go back and identify which photograph it is.
I guess my question is: What evidence do you have that the brakes were not fully applied from beginning to end? We had talked about that and you had referenced a photograph, but we didn't have it marked. Now let's go ahead and identify that.
A It's probably most evident in Exhibits C, B, and D that there are no skidmarks leading up to the final position of the rear tires of the Ruegg semi-trailer.
Q So at this point he was off the brakes?
A I cannot tell you that. I can tell that you the trailer tires were not skidding on the pavement. One side was obviously up in the air. The left side was up

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in the air. The right side was bouncing heavily. They were not, you know, eight tires in intimate contact with the pavement, skidding down the pavement.
Q So the marks that we see are just when it hits? It's not a brake mark? It's just the tire actually bouncing on the road?
A That's my interpretation of it. I cannot tell you with certainty whether the right tires of the tractor/trailer are braked or not, but the marks are more from bouncing than anything else. It's certainly not a continuous skidmark.
The trailer is swinging. It's not going straight ahead as if it's skidding. It's swinging as it's bouncing, because that line of bounce marks goes diagonally to the final position of the right rear of the trailer.
Q So you don't know if the brakes were applied? All you're saying is that they were not applied fully at that point?
A No. I'm not saying that at all, Mr. Bachmann. What I'm saying is that the tires weren't on the ground to do anything, whether the brakes were applied or not.
Q Okay.
A The left side of the trailer is up in the air. The right side is bouncing. How you treat that for drag

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factor, I'm not real sure, but it certainly isn't skidding.
Q Can we go back to the last paragraph on Page 2 of 5 and that sentence -- we have been dealing with that last full sentence there, "Both reconstructionists cited above assumed that the brakes of the HDVC were applied from beginning to end and were not aware of any period of brake release, whether full or partial, which assumption makes their calculated values of the initial speed of the Ruegg HDVC too high."
Is that different from what you just explained to me or is that the same thing?
A It's really the same thing. Having been questioned very closely by you about it, I would write it somewhat differently. I would say more than both Sgt. Veppert and Mr. Daecher assumed for purposes of their calculations of the initial speed of the tractor/trailer that the tires were and the brakes were fully applied and all the tires were fully on the ground from the beginning to the end of the accident sequence. Maybe that's a better statement.
I see where your questions are coming from and I apologize because that does not make it absolutely clear.
Q Just so we're clear -- and clarity is all important in these things -- your prior statement that you don't know whether the brakes were applied fully or not is not

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really the more clear one.
The clear statement is that we know from these photographs -- that are Photographs B and C that --
A And D.
Q And D that the left rear of the trailer was up in the air and the right rear was bouncing along the ground?
A For the last 15 or 20 feet of movement of the trailer until it came to rest.
Q You attribute that to the jackknifing?
A That is my interpretation, yes.
Q Now with that clarification, does that change the conclusion of this last sentence which says, "...whether full or partial, which assumption makes their calculated values of the initial speed of the Ruegg vehicle too high"?
A Okay. Whether you take the statement of Mr. Ruegg that he released the brakes at some time during the accident, then reapplied them or you take the photographic evidence that the tires of the trailer were not skidding all the way to its final position, either one will shift their calculated value from the initial speed of the tractor/trailer. The error would be to increase the speed.
Q That is the assumption that the brakes were continuously reapplied?

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A Either that or that the tires were in intimate contact with the pavement all the way from beginning to end and skidding.
Q Why does that increase the speed?
A Because the calculation of the initial speed of the vehicle assumes -- both in postcrash and precrash phases of the accident -- that all the wheels are on the ground and braking as hard as they can. Some of them will be skidding, some of them may not be.
Sgt. Veppert, for example, uses a method for estimating the effectiveness of the brakes. He uses that to adjust the coefficient of friction of the pavement and also adjusts for the grade of the pavement. He uses that with a distance of travel of the vehicle to calculate a speed at the start of that. He takes the postcrash and he starts his analysis. He work backwards from final position and goes back to the crash. The tractor and trailer traveled a certain distance at a certain deceleration rate which essentially is what the correct brake factor means. It's decelerating at .31G. It works out to be .6 times .51. You wind up with .31. That's what the calculation is. But if it's not decelerating at .31G over that distance, your estimate of its initial speed is going to be too high.
If you say that after the crash, the tractor/trailer

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traveled 1,700 feet and over that 1,700 feet it was decelerating at an uniform rate of .31G, you will come up with an initial speed of somewhere around 30 miles an hour, which is what Sgt. Veppert calculates.
But, in fact, if the vehicle only traveled 75 of those hundred feet at a deceleration rate of .31 and for the rest of it at a deceleration rate of .1, it's going to be a lower speed. Your initial speed is going to work out to be a lower value. So that's why I'm saying their error is going to be on the high side.
Q You mentioned that Mr. Ruegg told that you he was in the ninth gear of his 13 speeds, correct?
A Right.
Q What is the RPM range in that gear?
A The same as any other gear.
Q So he could have been running at 2500 RPMs in that gear?
A I don't think his engine can run that high. I think he's governed out at 2,000. His preferred range is 1,800 to 2,000. That's what he told me. That's what I took it as.
Q So you just accepted that at face value?
A I didn't imply that there is -- the only way I'd know what speed the engine was running is what Mr. Ruegg could tell me. I wasn't there. There was no photograph

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of the engine, so with what he said, this is how it works out.
Q Is it possible he was running at 2,200 or 2,400 or 2,500 RPMs in that gear?
MR. CALLAS: Objection.
THE WITNESS: Whatever that engine is governed out at. I don't know that engine.
By Mr. Bachmann:
Q You're not saying it could happen, but you're not saying it couldn't happen?
A If it's governed out at 2,000 and if the governor is working, it can't run any faster than that.
Q But I mean the answer is you don't know?
A I don't know for certain.
Q How did you say under these conditions the HDVC had a road speed of 39 to 43 miles her hour? Can you tell me how you calculated that or can you show me.
A Yeah. I worked this all out myself before I remembered that it's in Northwestern University's Traffic Institute Traffic Accident Reconstruction Manual.
MR. CALLAS: Let's take just a two-minute break.
(Thereupon, a recess was taken.)
(Thereupon, Davidson Exhibits I through T were marked for purposes of identification.)

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By Mr. Bachmann:
Q Mr. Davidson, for convenience sake on your notes so I can follow along, can we just mark I on the top of yours?
A Yeah, go ahead. Sure. Circle it.
Q You've got in front of you what has been marked as Davidson Exhibit I. You were about to tell me something that you did with the calculations on Pages 3 and 4 of that exhibit.
A Yeah, page 3 of that exhibit group that is dated November of 1997.
Q On Page 3, tell me what you were going to tell me.
A This is the information that Mr. Ruegg gave me over the phone. I transcribed it, because if you saw my handwriting when I'm trying to take notes of a phone conversation, if I don't transcribe it immediately, I can't read them the next day. So I transcribed it.
It says 400 Cummins. That's the engine in the tractor. The op range or operating range is 1,800 to 2,000 revolutions per minute.
Do you want me to read down through the whole thing?
Q We were just going to go through the calculation.
A There is the equation the velocity of the tractor/trailer in feet per second. The road speed of

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the rig in feet per second is equal to 0.00436 times the range 1,800 to 2,000 divided by the -- I was using both the ninth, tenth, and eleventh speed gear ratios, so it was between 1.35 and 1.57 for the transmission ratio times 3.7 which was the rear axle ratio times 42, which is the free diameter of the drive tires. Your answer comes out 50 that you see below.
If you use the 1.57 ratio, which is the actual ninth gear of the 13 speeds on the box, you come out with a road speed of 39 to 43 miles per hour.
Q What you've got here -- we've got 1,800 and 1.57 then 2,000 and 1.35. Those are the --
A Those are the different inputs that I used for the equation. I put in 1,800 RPMs and the transmission ratio of 1.57. Then I put in 2,000 and used 1.35 as the ratio. Then I put in 1,800 and 1.35 is the transmission ratio. Then I put in 2,000 RPMs and 1.57 is the ratio.
Q Why did you do it both ways?
A Mostly just for the hell of it.
Q Okay. Anything else?
A Ninth speed gear ratio is 1.57. The next one above that is 1.35. Just for the heck of it I knew somebody would ask me what if he was in tenth gear. I would have to say that he was between 45 and 50 miles per hour if he was in tenth gear.

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Q Tenth gear with the 1.35 ratio?
A Yes.
Q So that's where we get the 39 to 50 miles an hour?
A 45 to 50. It goes diagonally. Don't ask me why I did it like that because I don't know.
Q So at 39 miles per hour, he's traveling 56.74 feet per second?
A That's right.
Q Then --
A The output of this equation is in feet per second, then you have to convert it to miles per hour.
Q So at the high end, if he's going 50 miles an hour that was 73.32 feet per second?
A That's if he's in tenth gear at 2,000 engine RPMs.
Q At 45 miles an hour, he's going 66 feet per second?
A Yeah, that's 66 feet per second. The output of the equation is in feet per second.
Q But regardless of what gear he's in at 45 miles an hour, he's still going 66 feet per second?
A Him or anything else that is going 66 feet per second, goes 45 miles an hour and vice versa.
Q So this is how you calculated the 39 to 43 miles per hour?
A That's right.
Q This is all based upon the assumption that Mr. Ruegg

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was running 2,800 to 2,000 RPMs in ninth gear?
A 2,800 to 2,000?
Q 1,800 to 2,000.
A Right.
Q You said the HDVC at a road speed of 39 to 43 -- I'll withdraw that.
Are there any other assumptions in this calculation?
A No. That's it.
Q Okay.
Engine speed; transmission gear ratio; final drive gear ratio; tire size. Then you said something occurring on the next page.
A That's in case -- well mostly for my own satisfaction, the constant 0.00436 is in the equation to find the road speed from gear ratios and tire size. And what that ratio represents it converts from inches to feet. It converts the diameter of the tire to its circumference and it does revolutions per minute to revolutions per second to wind up with feet per second for the velocity of the tractor/trailer.
It has a number to tell you where to find that formula in the Traffic Accident Reconstruction Manual from Northwestern University Traffic Institute.
Q Where was Mr. Ruegg at that point in the roadway? Where was he located if he was going 39 to 43 miles an

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hour?
A Wherever he was on the road when he was running 1,800 to 2,000 RPMs in ninth gear.
Q Anywhere?
A He could have been 50 miles back. I don't know.
Q Are you saying this is the speed he was at when he initiated braking?
A I believe that's his recollection. I'm just taking that and saying this is what it works out to be.
Q Are you able, based upon the work that you've done, to determine the speed he was going when he initiated braking?
A No. In my opinion, nobody else can either.
Q Why couldn't you do it?
A Because we have no basis on which to estimate the coefficient of friction between heavy-duty truck tires and bituminous concrete pavement with excess tar on the surface. There is simply no literature on experimental results anywhere to guide us in that.
Q Assuming that -- this is just for the purpose of this question. Assuming that there was no excess bitumious tar on the pavement, could it be calculated?
A Yeah. It could be estimated with great difficulty, but it could be estimated.
Q How?

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A You'd have to determine -- first you have to sort out all the tire marks on the pavement. I'm not sure that you can do that from what we have available. I don't think you can do that, sort out which marks are from Skidmore's truck and which marks are from Ruegg's truck and which marks are from the van being pushed by the truck. I'm not sure. I don't believe we can sort them out now with what we have at hand. We would have to note exactly where braking by the Ruegg rig initiated.
We would have to account for every foot from there on. I don't mean to be that nasty about it. Within the limits of field measurement, how much of that distance is braking up to collision and how much after is braking and how much is something else, whether it's tires in broad slide or whatever that might be. You'd have to account for all the distance and assign a reasonable value for the drag factor for each different segment of travel, then start doing the calculations back again the same way with the van postcollision.
If you don't want to simply assume that the departure velocity of the van is the same as the departure velocity of the tractor/trailer from the calculation, you have to work that out with the drag factor. The distance of the transition and the center of the mass of the car would be quite a complicated process.

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Q Is there a way to determine what the minimum speed had to have been?
A No. Again, because -- are we still under your assumption?
Q Yes, sir.
A We are still under your assumption. His minimum speed? No.
Q Why not?
A Because we can't sort out those tire marks to assign appropriate drag factors and everything else.
Q Let's say you could sort out the tire marks and let's say you made an assumption that his tire marks started at the point where the tires went left of center.
A Which is Sgt. Veppert's assumption.
Q That's the basis for his analysis.
A He's assuming uniform skidding from there to final rest with the collision in between. First of all, you have to be able to separate precollision and postcollision. You have to identify what is generally called point of impact, the first contact where the vehicles are along the roadway when they first come into contact with each other. That is being assumed to be the place where there is a scrape on the pavement. At least that's what Sgt. Veppert indicates in his drawings.

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The fact is I don't know and I'm not sure anybody else knows what made the scrape on the pavement. We assume it's some part of the van, assuming that the on-scene investigators recognized that as being related to this accident and not to anything else and that it was absolutely fresh. It was just absolutely a fresh mark, what part of the van did it and in what moment of the collision sequence did that mark get laid down?
If I may, I'll dig out a photograph and show you. Maybe it's already in here. This is a perfect candidate for a scrape on the pavement.
(Thereupon, Davidson Exhibit U was marked for purposes of identification.)
By Mr. Bachmann:
Q Mr. Davidson, I'm handing you what has been marked as Exhibit U.
A In the background of this photograph we have a view of the left rear driver's side of the van that was involved in the crash. We're looking back toward where the tractor/trailer came from, looking away from the railway crossing. If you look, you will see the bare rim of the left rear wheel of the van on the pavement. The tire has been pealed back off the rim. It's been what we call debeaded, d-e-b-e-a-d-e-d. The bead has been unbeaded from the rim. The bare rim is hanging out.

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This is a good candidate for a scrape on the pavement. On the other hand, if we look at other photographs of the car -- that one, for example. (Indicating.)

(Thereupon, Davidson Exhibit U was marked for purposes of identification.)

THE WITNESS: Exhibit V is the rear view of the van. We see the interior panel of the left gate hanging down. We see the exhaust system hanging down, but nothing really in contact with the road that is going to give us a good scrape mark.

Now the first hit of the tractor/trailer to the van, as best as I can make it out from the witness statements and the photographs and so forth, is the right front of the tractor hit heading toward the left rear of the van, which then accelerated the van forward, but then rotated it clockwise. It hit the tractor, hit the passenger's side of the van toward the rear again, which you can see in other photographs.

I can't see anything hanging down under the van that is going to make a mark or a scrape on the road. I can't in Exhibit V, but in Exhibit U I see a bare wheel rim.

By Mr. Bachmann:

Q Wouldn't you agree that on impact, when the Kull

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vehicle was rear-ended initially, that would be a tremendous downward force on the vehicle?

A No.

Q Why not?

A Why would there be a downward force?

Q I'm asking you why wouldn't there be.

A Well I'm saying I don't see any reason why there would be a downward force. The tractor didn't fall on it. It hit it from the back. If you look at the overall photos of the back of the van -- let me try to find one.

It pretty much looks like -- well, okay here. (Indicating.) Have that marked if you would. Wait. That, to me, looks like a pretty full height impact on -- I'm going to say the left third of the rear of the van all the way up to the roof line. I don't see any downward force. I don't see anything that would produce a download on the van. This would be like a full height moving barrier into the back of the van with about a 30 percent overlap.

(Thereupon, Davidson Exhibit W was marked for purposes of identification.)

By Mr. Bachmann:

Q The last one you were referring to was Davidson Exhibit W, correct?

A Yes.

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(Thereupon, Davidson Exhibit X was marked for purposes of identification.)

By Mr. Bachmann:

Q Now I'll hand you what has been marked as Davidson Exhibit X. Between W and X, which part of the Ruegg tractor hit the rear of the Kull minivan?

A Well a good bit of it hit at various times or at least two impacts.

Q From the front of the tractor on X?

A Yeah.

Q Okay.

Show me while you're looking at it.

A There is part across the bumper. There is part more over toward the left side, the driver's side. (Indicating.)

Q So I guess I'm confused. So the Ruegg -- the front of Ruegg's truck rammed the Kull minivan twice in the back?

A That's the way I interpret that.

MR. CALLAS: Objection.

THE WITNESS: Again, this is my interpretation.

By Mr. Bachmann:

Q Let's clarify that a little bit. If you can, kind of just go through the sequence of how it hit.

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A It hit the rear of the van.

Q Okay.

A The tractor was coming down the road approaching the van and the rear of the van got hit. It looks like to me that the overlap was about one third on the left side of the van.

Q On the driver's side of the van?

A Yes, from the driver's side about a third of the way across the back. That's what it looks like.

Q Then you say he hit it again with the driver's side --

A Passenger's side rear of the van. Try that one.

Q I'm sorry. I thought you had said that -- in looking at Davidson Exhibit X, this is the front of the Ruegg truck, right?

A Yes.

Q I thought you said that the front of it had hit the rear of the minivan twice.

A No. It hit the rear once and then the right side rear the second time.

Q Then when it jackknifed --

A It bumped it still another time with the right rear tires of the tractor.

Q I am confused about the second hit. Can you explain that to me again, because there are three hits that you

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mentioned, right?
A There are two hits. The third one I don't know how significant it was, but they wound up in contact.
Q The third hit being when the truck is fully jackknifed?
A Fully jackknifed, the right rear of the tractor is contacting the right side rear of the van.
Q The first hit with the impact on the left rear driver's side of the minivan?
A Yes.
Q So where is the second hit?
A The right side rear of the van. Here it is. (Indicating.)
Q So when the right side of the minivan was hit, the passenger's side of the minivan was hit, that was the front of the truck that hit it?
A Yeah. When the truck hits the back of the car and it's an offset strike, the car will rotate. The van rotated. The van -- well you see the van in the pictures, such as Exhibit B. The van is cross-ways to the road. It didn't start out cross-ways to the road. It started out in line with the road. It was rotated by the first impact. As it rotated, then it exposes its passenger's side to the tractor, to the front of the tractor.

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Q To the very front bumper of the tractor?
A Well to the front. You can see that the headlights were knocked loose. I don't know whether they are broken or not. There is minor damage to the grill.
Q On the driver's side?
A Yeah.
Q Then that's what caused the major damage to the side of the minivan and to the passenger's side?
A Again, that's my interpretation. That's when this side damage occurred.
Q Not from the back of the tractor rig?
A No. If you look at the back of the tractor, it's not high enough to account for the damage higher up on the minivan.
Q So if there was damage --
A There is damage up high on the minivan way above the level of the bumper of the truck.
Q So if there was damage when it jackknifed, it would have been minimal compared to the second impact?
A I don't know. I can't see. I can't see because the second impact was definitely much higher than the right rear corner of the frame of the tractor. That's why I say there are really three impacts.
Q Actually you're not sure what took it to that point?
A You were asking about reconstruction and I was

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saying that Sgt. Veppert had assumed that scrape was from the position on the strip of the roadway that was the point of impact. I disagree. The point of impact was further back than where that scrape is.
MR. CALLAS: Why don't we say further north.
THE WITNESS: Further north than where that scrape occurred. That scrape didn't occur until later in the collision sequence. I think it was at the second impact.
By Mr. Bachmann:
Q You are saying that because of a photograph of the left rear on the driver's side tire?
A Right. The other photograph shows the rear of the van. I don't see anything that could be driven or that would be driven down on the pavement to make a scrape. Now I have to say in honesty I don't know what that scrape looked like. I don't know what shape it was. I just know its location on the roadway from the accident report.
Q Can you tell me in looking at Davidson Exhibit U, the photograph, and particularly focusing on the left rear passenger tire of the Kull minivan -- can you tell me within a reasonable degree of scientific certainty whether that tire caused the scrape on the road or not?
A No, I can't. All I can say is it's an exceptionally

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good candidate. That's my point. We've got so much missing that it would obstruct any attempt to try to reconstruct the accident.
Q Is it possible that Mr. Ruegg was going 45 miles an hour?
MR. CALLAS: Objection. Anything is possible. Go ahead.
THE WITNESS: Probably. I don't know how fast he was going.
By Mr. Bachmann:
Q I mean --
A That's my point.
Q Can you tell me that it's any more likely that he was going 39 to 43 miles an hour than if he was going 47 to 49 miles an hour?
MR. CALLAS: Objection. Go ahead.
THE WITNESS: No. My point is that nobody can tell us how fast that van was going at the beginning of the accident sequence from the physical evidence. There are too many missing links. There are just too many missing links.
By Mr. Bachmann:
Q Nobody including you?
A Including me. When I put down a number there, that was a guesstimate. I hope I identified it as a

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guesstimate.
Q This is on Davidson Exhibit A on Page 3 of 5, the 39 to 43 miles per hour. Can you say within a reasonable degree of scientific certainty that Mr. Ruegg was going 39 to 43 miles per hour?
MR. CALLAS: Based upon what assumption? Objection.
THE WITNESS: I can say to a high degree of technical certainty that if Mr. Ruegg was driving his 400 Cummins engine at 2,800 to 2,000 RPM in ninth speed on a Fuller Road Ranger RTO 12513 and that the drive axle tires on his truck were 11R22.5 and that his rear axle drive gear ratio is 3.701, then, yes, he was going 39 to 43.
By Mr. Bachmann:
Q Using all those assumptions?
A I have to use those assumptions. I said under those conditions, the vehicle would be traveling between 39 and 43. If you change those conditions, you change the numbers.
Q Using your formula, the information that you have in Davidson Exhibit A in the first paragraph there on Page 3 of 5, using your formula on Page 3 of Davidson Exhibit I assuming he was going 45 miles an hour -- I'll withdraw that.

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You had mentioned -- I'll withdraw that.
Page 3 of Davidson Exhibit I, you have -- on the bottom part of it, you've got the different assumptions for ninth gear and tenth gear. What is the final drive ratio?
A Where.
Q Like you've got 1,800 RPMs and 1.57, which is ninth gear.
A I'm assuming that the rear end ratio and the final drive ratio is 3.7021. That does not change. I'm only changing the engine speed and whether it's in ninth gear or tenth gear.
Q That 1.57 is the gear ratio?
A That's the ratio for ninth gear of the 13 speeds and 1.35 is the ratio for tenth speed. This is the overall transmission ratio.
Q You've got a range of 1,800 to 2,000 RPMs. Maybe this is a dumb question, but I frankly have no clue. Is 2,000 RPMs the maximum you could go on either of those gears?
A The engine speed is independent of the gearing. On a diesel, you want to run the engine within a fairly narrow band of engine speed, because that is where it's most efficient and most powerful. So you know if your engine runs best at 1,800 to 2,000, that is why you have

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13 gears, so you can gear down or gear up to adjust and to keep your engine speed in that band and get the best road speed you can get out of it. Whatever the speed limit is or traffic conditions are, you should keep your engine RPM in that range.
Q You said you didn't know if there was a governor to limit it to that?
A I honestly forgot to ask him whether it's actually governed or not. Many of the Cummins engines are. They have a top-end limiter. They just won't run any faster.
Q So if he was going 45 miles an hour, then you would have him in tenth gear, right?
A Assuming his engine is governed out at 2,000 RPMs, yeah, because 2,000 RPM will only get him to 43.
Q What happens at 44?
A You gear up. When you drive alongside a diesel engine, you hear it screaming. That's not the engine that's screaming. That's the turbo charger that you hear making that high whistling noise. The engine itself sounds the same all the time pretty much. If you ride in one, the guy is going up and down through the gears and everything. The engine always sounds pretty much the same. It's not like a gas engine as with your car where the engine speed changes pretty widely.
Q Let's go to back to your report, Page 3 of that

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which is Davidson Exhibit A. Go to the second full paragraph, the biggest paragraph on the page. In the last half you say: "The most authoritative source available suggests that a total perception-response time of 1.75 seconds would not be excessive, indeed, it might reasonably be even longer. Allowing optimal air brake system response time ("brake lag") of 0.5 seconds and a drag factor (adjusted for the pavement surface and its downgrade) of 0.20 it would take a total distance of 320 feet to bring the HDVC to a stop. Under Sgt. Veppert's analysis the collision could not be avoided."
Do you see that?
A Yes.
Q What is the range of reaction time that you gave Mr. Ruegg under these circumstances here?
A I would take 1.75 seconds because it's not an absolutely simple discrimination. If you're driving down the street and you're in the middle of the block and the traffic light at the next corner turns red, you don't have any problem. You just take your foot off the gas and put it down on the brake. That takes about a second and a half on an average. You can go to all kinds of sources and they have got all kinds of numbers. The consensus is that it's around a second and a half. That's a very simple response and a very simple

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discrimination. The light is green. The light is red. That's a very simple discrimination.

On the other hand, you come around the curve and you see the rear end of a vehicle up ahead of you that you didn't see before. What does that mean? You don't know what it means. That's my point. You don't immediately know what that means. If you're going 35 and you come around the curve and now you see a vehicle in front of you that you didn't see before, that vehicle could be going 25 miles an hour and you're just slowly overtaking it. You don't instantly know that the vehicle is stopped in the way that you instantly know that the traffic signal is red. So instead of a second and a half -- I'm going to apologize to the court reporter.

When I was a boy scout so long ago that none of you would even be here to think about it -- I don't want to think about how long ago it was. We were taught to count seconds. One thousand one, one thousand two, one thousand three, one thousand four and so on. Okay?

You say it very quickly, but clearly. You can check it against a stopwatch. Each syllable -- one thousand one. Each of those syllables is a quarter of a second. One thousand, that's half a second. One is a quarter of a second with all the time tagging on until you see the red light. You know what to do and you see the back of

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the car. You need to decide what to do. Is the car stopped? Is it going 25? Should I just let off the gas? Is it stopped? I'd better get on the brake. I am only allowing one for that on top of the normal perception response time. I don't think that's unreasonable.

I'm sorry, does that answer the question?

Q So that's the --

A That's the basis for the 1.75 seconds perception-response time for Mr. Ruegg.

Q You say -- I'll withdraw that.

You said it might reasonably be even longer. What is the limit of reason there, two seconds or two and a half?

A I don't know. I'm just saying that's the fastest I can imagine that anybody can make that discrimination, a vehicle stopped from a vehicle which is moving, at a quarter of a second. I don't know how much longer it might take.

Q Would two seconds be unreasonable?

A I wouldn't think it's completely beyond reason. I don't know.

Q Would two and a half be unreasonable?

A We're talking around those recommendations? Is that what we're talking about?

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Q I'm just asking you would that be unreasonable, two and a half seconds?

A For an old geezer like me? Maybe not. I don't know.

Q For Mr. Ruegg?

A I don't know.

Q You put it at 1.75.

A I put it at 1.75. I think that's the minimum. I think that's at the low end. I want to be, you know, low end.

Q Can you give me a high end?

A No.

Q Can you say that 2.5 is out of the range of reasonableness or 2.75? I'm just trying to get a range.

A I don't know.

MR. CALLAS: Asked and answered. Go ahead.

THE WITNESS: I really wouldn't put an upper limit on it.

By Mr. Bachmann:

Q Would you agree with me that --

A You know, at that moment -- let me just, for example, say that at the moment that Mr. Ruegg is coming around the curve and he's in the position where he could see the rear end of the van, he might be looking down at his speedometer or his engine temperature or any of the

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other things you are supposed to monitor while you're driving. He might look at this for half a second and then look up.

Do you see why I'm saying I can't tell you?

Q Would you agree with me that if his perception-reaction time was 1.5 -- I'll withdraw that.

If it was 2 or 2.5, that would put him further north and further back up the hill at the point at which he saw the vehicle.

A Okay. I see what you are saying. At some point in time, the brakes are applied and the tires start putting marks on the road. We're working back from that. You are saying, "Well however fast he was going for however many seconds it took him to perceive and respond and then go to the brakes, that's how many feet further north he was when he saw the van and began to perceive it." Fine.

Q So if that perception-reaction time is -- the longer that perception-reaction time is, the further north he is when he first spots that vehicle, that Kull minivan?

A Yeah. That would follow -- you know, as long as you can tell me how anybody knows that his perception-reaction time was two seconds or two and a half seconds. I don't know.

Q But I mean you agree with that statement, correct?

A Distance and time are a function of speed. If you

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take the speed and the time, you wind up with the distance, okay? It's a mathematical equation, period.
Q The more time and the more distance he has --
A The higher the speed, the more distance you cover in the same time or -- you know, any way you want to play the game.
Q I'm not trying to play a game here.
A Any way you change the input to the equation, the output changes. You give it more time at the same speed, you get a longer distance. If you've got a higher speed at the same time, you get a longer distance.
Q This is assuming the speed range that you have, 39 to 43, puts him further up the road then you've got a two and a half second perception-reaction time?
A As opposed to 1.75?
Q Yes.
A Yes. That's simple mathematics. It's not reality, but it's simple mathematics.
Q You say to allow the optimal air brake system response time of .5 seconds. Where did you get that 5 seconds?
A That's generally what's taken in the field for set-up time for brakes with optimal adjustment. The FFV limit for it is 4.5 seconds. Brand new vehicles that have never seen the road will often do quite a bit

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better. They have shorter set-up times.
Q That is added to the perception-response time?
A Yes. Perception-response time only comes up to the point where Mr. Ruegg or any other driver slams the treadle down. Then once he does that, all he has done is open a pair of air valves. The air pressure has to then build up in the system before the brakes actually apply. It's not like your car which has hydraulic brakes. When you start coming down on the pedal, those brakes start to apply. There is no lag in a hydraulic system. In an air system here, you put the treadle down, then you start to feel the truck slow down.
Q You have a drag factor of .020 adjustment for pavement surface downgrade. Can you explain how you got that?
A Yeah. I'll tell you quite frankly that it's a WAG.
Q It's a what?
A Wild-ass guess. That's a term of art in traffic accident reconstruction. Only you have a two-page paper memo on excess tar that is headed Excess Tar. You have four copies of it over there I think.
Q Is that what we are going to talk about next?
A Yeah, because you are asking me where I got that drag factor. This is going to tell you something about it.

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Q Let's find the memo.
A I thought it was underneath here. Try looking all the way underneath. Several copies of it were floating around.
(Thereupon, Davidson Exhibit Y was marked for purposes of identification.)
By Mr. Bachmann:
Q I'm handing you what has been marked as Exhibit Y. You were just getting ready to talk about excess tar, so please continue.
A Well what I did was research the whole source. I could find quite a bit. I could only find two references for coefficient of friction bituminous concrete, that is asphalt pavement with excess tar at the surface.
The first one is the old standard, which is Jim Baker's research from way back when, which is included in here called Traffic Accident Reconstruction by Northwestern University Traffic Institute at Page 62-14. It gives coefficient of friction of this kind of surface from speed. I forgot to include the speed in excess of 30 miles per hour, initial speed in excess of 30 miles per hour of 0.35 to 0.60. These values are for ordinary passenger cars and light truck tires. They are not for heavy truck tires, okay? There is no information anywhere that I can find that says what percentage of the

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passenger car values on this service you take for heavy truck tires.
The only other reference I could find in the literature is from a paper which refers to tests done in 1982 from initial speed of 40 miles per hour on "Bituminous concrete, some asphalt bleed." ASTM skid trailer tests were performed and it came up with a mean skid number of 42, which means a drag factor of 0.42, which is within the range, the low end of the range offered by Baker and Fricke, although Baker really did the work.
That citation was in the paper funded by the Transportation Research Board and published by the National Technical Information Service. I can find no reports whatsoever of skidding heavy duty truck tires on bituminous concrete pavement with excess tar at the surface. I think that temperature variation probably has more influence on this surface with truck tires versus passenger tires than in other situations where temperature variations are very small and meaningless.
Finally any attempt to estimate the dynamic coefficient of friction of heavy-duty truck tires on a bituminous concrete pavement with excess tar at the surface is pure guesswork and unreliable for purposes of traffic accident reconstruction. That is my position.

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Q Why are truck tires so different than passenger car tires?
A They are a different rubber. The tread rubber on truck tires is much harder than on passenger car tires. On dry, ordinary surfaces, the conventional wisdom is to take 75 or 85 percent of the passenger car skid coefficient of friction for heavier trucks. That's the conventional wisdom.
On the other hand, there are plenty of studies. There are a number of studies. There are a number of actual skid tests and summaries of skid tests that show that it's at 60 percent. This was not a dry, ordinary surface, so I think that the conventional wisdom is highly suspect. I don't think -- it's the only reference I find where actual skid testing of heavy trucks is done. We're coming up with values that are 60 to 65 percent of the passenger car values, not 75 to 85 percent. So conventional wisdom is wrong in my judgement.
On ordinary surfaces, we've got references. We haven't got one, that I've been able to find, for skidding of heavy duty truck tires on an excessive tar surface. Not one single test. Then when you say what is the drag factor of a heavy truck tire on a surface with excess tar, there is no basis in fact for it. No basis

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whatsoever. We're all out in the cold. That's what I'm trying to say. We're all out in the cold on this.
Only by assuming a whole lot of things -- that aren't true in my judgement -- about this particular accident can we come up with what looks like a plausible reconstruction. This is not an attack on Sgt. Veppert. Please don't misunderstand me. He's doing the best job he can with what he's got to work on, but what he's got to work on can't be worked on with confidence.
Q This is because of the assumption of this tar problem on the road?
A Right. Take the .35 that Baker cites, okay? Now take 75 percent of it, then adjust for a 9 percent downgrade. You come up with 0.17. I said, "Well let's be ridiculous and make it simply 0.20."
Q So --
A That's as good a guess as anybody's.
Q That's a raw guess?
A That's a wild-ass guess. It's as good as anybody's on that pavement. Let's call a spade a spade.
Q How would this feel when you're walking it? Would it be tacky? Could it be loose?
A It might tend to be tacky. It depends on where you're walking.
Q Would it be noticeable to the average person walking

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on it?
A I don't know. I wasn't there and I don't know.
Q Would it be noticeable to an ODOT engineer or project superintendent who deals with asphalt?
A Who was there at the time of this accident?
Q Would that be noticeable?
A Are you telling me somebody was there?
Q I'm asking you would it be noticeable?
MR. CALLAS: Objection. Asked and answered.
THE WITNESS: I don't know. It depends on what he's paying attention to.
By Mr. Bachmann:
Q How long would this condition last?
A I don't know. I went through that before. I don't know.
Q Then continuing with Exhibit A on Page 3 on to Page 4, you've got that one paragraph that starts with, "There is one further matter which I will address," then go on to the remainder of that paragraph on Page 4.
Without actually sitting down and running through the measurements themselves, can you tell me what it is you're trying to accomplish here? Take your time and read through it.
A What it all says is that there was a long string of traffic that no one else has accounted for. There are

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two vehicles missing from everyone elses' account except Abe Berry's. He was driving the rollback recovery truck. He said there were two vehicles in front of him north of the railroad crossing and he was 50 feet or so behind them, then you work it all out. It puts the back of the Aerostar 270 feet, I think, north of the --
Q Railroad crossing?
A -- railroad crossing, but that again, I think, is assuming that scrape mark is the point of impact. I think the Aerostar was further north than that 270 feet, but I can't tell you where.
Q I'm a little confused. With Mr. Berry having the two vehicles there and being 50 to 60 feet from those vehicles, that puts the rear end of the Aerostar at 270 feet from the north rail of the railroad track.
A Yeah, if we assume -- I didn't make that entirely clear. If we assume that the scrape mark is where the rear of the Aerostar was when the collision occurred, that's quite a bit back from the intersection. There is a longer string of cars there because Mr. Ruegg said so and I simply accept that. Okay? That Aerostar was further back up into the curve than he had ever experienced before of cars backed up from the railroad crossing. In fact, there is not four cars but six cars, if you call a rollback wrecker a car in that string.

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Then there is some substantial distances between them. They are not half a car length apart. Mrs. Kull says she was two cars lengths behind and Mr. Berry says he was 50 feet behind the car in front of him. So you get a much longer string than it would at first appear and his claim then seems reasonable.

If it is so, then it could be a violation of his expectancy of whether you might see a car backed up from the railway crossing. He saw the back of the Aerostar. It was too far back for that and it was confusing, which violation of his expectancy would probably cause some confusion in his mind in interpreting what that van in front of him meant and would most probably lengthen his perception-response time. That's what that exercise is all about.

Q That's what these two paragraphs on Pages 3 and 4 are all about?

A Yeah.

Q As part of this, this is also assuming that -- just so I'm clear -- that the rear of the minivan was 270 feet from the north rail of the railroad tracks. Or am I incorrect?

A That is where Mr. Daecher puts it. That's approximately where Sgt. Veppert puts it. I think he puts it even closer to the railway. As I said before,

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that's based on the assumption that the scrape on the pavement is in the position of the rear of the van at impact. I say no. The van was further to the north when the impact occurred. The scrape occurred later in the collision sequence. The van was more than 270 feet.

Q Then you do that just by simple mathematics? You add that all up?

A You add that all up. It's got to be 270 feet at least. It could be 300 feet.

Q How much does this add to this -- his violation of expectancy, as you say, add to his perception-reaction time?

A I don't know.

Q Can you give me a range?

A I don't think I could. I don't think the literature encompasses if anyone is willing to stick their neck out and say this is an appropriate range. It's pretty hard to test that kind of thing.

Q If Mr. Ruegg was going 25 miles an hour going into that left reverse curve, could he have stopped in time to avoid the accident?

A What other assumption are you making?

Q Road conditions as you have described them and the vehicle positions as you have described them.

A If he's going 25, does he get stopped before he

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collides?

Q Yes, sir.

A I don't know. It depends on his perception-reaction time and --

Q 1.75 seconds.

A If you take him from the same point -- let's assume for purposes of argument that he skidded 100 feet before he hit the back of the van. I don't think he skidded that far. So he's 100 feet from the van when the brakes are applied. Then we go back a half second for the brake applying time, system response time, then we go back 1.75 seconds. We do those two times at 25 miles per hour. Then from 25 miles per hour, what does the drag factor have to be for him to stop at 100 feet, becomes the question. It remains the question. That's where the brakes come on.

Do you want me to do the calculation --

Q Could you?

A -- and tell you what the drag factor has to be?

Q Is that something that you could do for me?

A I can do it with a calculator.

Q Okay.

A We're going to take his initial speed, the 25 miles per hour times 1.4667, which gives his speed at 36.675 feet per second, squared, and divided by the quantity 2

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times the acceleration of gravity times 100 feet and .20 would have to be the drag factor to get the truck stopped at 100 feet.

Q Okay.

A Does that answer your question?

Q Thank you.

In going back to Page 3 of Exhibit A, your report this says that it took 320 feet to bring the vehicle to a stop.

A Yes.

Q How many feet of perception-reaction distance are you accounting for in that 320 feet?

A 35 miles per hour times 1.4667 is 51.33 feet per second times 1.75 seconds is 0.8983537 feet. Let's call it 90 feet. I couldn't resist.

Q That's at 35 miles an hour?

A Yeah. The faster you go, the longer that distance becomes for the same time. The slower you go, the shorter that distance becomes for the same time.

Q So the purpose of this paragraph is really to destroy Sgt. Veppert's opinion with regard to the 35 miles an hour?

MR. CALLAS: Objection.

THE WITNESS: I wouldn't characterize it that way. I would say I disagree with Sgt. Veppert. I

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don't think the drag factor is there. I think he's underestimating perception-response time and brake system response time.
By Mr. Bachmann:
Q Did you do any analysis of the skidmarks from the OH1 from the accident report?
A Did I draw them out --
Q Did you --
A -- to length or anything?
Q Yes.
A No. I had the same trouble that Sgt. Veppert did. I looked at those photographs. I really couldn't sort them out. I don't know which marks are from which truck.
There were some very funny things happening to Mr. Ruegg's tractor/trailer. There was some trailer hop, which I ascribe to -- because both Ruegg says so and Abe Berry says that he heard first the brakes, then the trailer hop. So he started braking then started hopping. I think that's attributable to those trailer hop skip skids in the beginning of the northern end of that pattern of tire marks, which are attributable to Ruegg's rig. But there are funny things going on with it afterwards. It was bouncing around the trailer and bouncing out, then coming back and doing this weird

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stuff. I can't really sort that out from the photographs.
Q At the speed of -- I'll withdraw that.
Assuming that you don't have this tar condition on the pavement, what would be the drag factor?
A For a heavy truck, somewhere between .45 and .6 for level road. I'd say, you know, adjusting for the 9 percent or 8 percent downgrade -- I am not going to argue about one hundredth -- around .5, assuming that all the tires stay on the ground and are drawing the best they can. The best that the truck can go, assuming no excess tar, is .5.
Q Assuming the tires all stay on the ground at the end and at the beginning?
A All the way through that the tires stay on the ground. They have got to be down there all the way, though, for any assumption of drag factor to be valid. That's a problem in this analysis, because there are some very funny things happening. Once the impact occurs, which is further north than we think it is, there are funny things happening to Ruegg's rig. It's not just sitting on its wheels and skidding.
Q Those funny things are the trailer hop?
A Well at the very end you are getting that terrific bounce with the left side of the trailer up in the air

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and the right side bouncing on the ground. But before that, there are all kinds of perturbations in the tire marks that appear to be from Ruegg's tractor/trailer that suggest that it's rocking and rolling in response to the impact and steering inputs and what all.
Q Do you have any opinion on what effect, if any, the condition of Mr. Ruegg's brakes had on his ability to stop?
A I said in my opinion and under the circumstances which I see prevailing at the accident site at the time of the accident, no, they didn't have any effect. The best brakes in the world wouldn't have done him any better.
Q What if you take out the assumption of the tar?
A Then you have a whole different ball game in terms of drag factor. You still have the same problems about whose skidmarks are whose and where do they start and are they continuous and so on. But there is less of a problem because you could take and assume a low normal coefficient of drag and say, "Well this is the ball game," and probably not have to argue about it.
Q Did you do any analysis of the stopping ability of his brakes given the amount of wear or the amount that they are out of adjustment?
A Yeah. I did pretty much the same thing that

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Sgt. Veppert did and I don't have any disagreement with his N factor calculations.
Q So using the assumptions that he made, what he did was correct?
A His computation of the brake efficiency is fine. It's right straight down the line. No arguments.
Q Is there any evidence of panic braking?
A Yeah.
Q Where do you see that? Can you show me where or how you know that.
A Trailer hop. You only get that when you brake hard.
Q Was there any evidence that you could find of Mr. Ruegg's steering or attempting to steer to the right?
A I can't be sure, because it's hard to unscramble those tire marks. I'm not absolutely certain.
Q As he's coming around that turn and given the speed that you have him going at 39 to 43 miles an hour, where would the momentum tend to take him? Straight, left or right?
A Momentum always acts straight ahead, okay? If you're traversing a curve, your instantaneous velocity and your instantaneous momentum is always tangent to the curve at that point. So that if your tires do not have adequate frictional side force, you will go out tangent to the curve at that point, which means that you run out

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of the curve. You go straight in and the curve keeps going around.
Q Is there any evidence that Mr. Ruegg's truck was just -- I'll withdraw that.
Let's go back to Exhibit I, if we could. Page 1 is just your remarks of what the photographs look like.
A Yeah.
Q How about Page 2? What's that? Is that the number for the gearing?
A That's the gear ratio.
Q What's the 0.87?
A That's what Fuller would call ninth gear. But if you read down the column on the right, they have different names. They don't just start one, two, three, four, five, six, seven, eight, nine. They say low, first, second, third, fourth, fifth, fifth overdrive, sixth, sixth overdrive, seventh, seventh overdrive, eighth, eighth overdrive to ninth. That's the way they call them. The 0.87 is the ratio in what Fuller would call ninth gear, but what Fuller calls ninth gear and what a truck driver calls ninth gear out of 13 -- if you count down 13, you know, don't count low gear. You've got 13 speeds above that ninth gear, the 0.87. That's 60 miles an hour. That's out of sight. That's not even reasonable. So just counting up from the bottom the way

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a trucker would, ninth gear is 1.57.
Q The next one I have is marked Davidson Exhibit J. At the top it says COLM.
A Convolution of linear momentum. That's what that stands for. I was looking at the form of the equation that Sgt. Veppert was using in his report. I was not familiar with it. It took me a while to figure out what the 31.05 represented, because he didn't say where it came from.
Q Did you figure it out?
A Yeah. It's double V for the van.
Q So do you have any qualms or problems with Sgt. Veppert's calculation?
A I disagree with the drag factor values, but then in this convolution of linear momentum analysis, he's got the weight of the tractor/trailer. The curve weight of the tractor/trailer is 27,380. When the load slips, it's 29,000-something. I come up with a different weight for the van, but it doesn't matter. The difference is insignificant.
Q The next is Exhibit K, which is correspondence from Mr. Soles.
A Yeah.
Q Any there other criticisms that you had of Sgt. Veppert's report?

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MR. CALLAS: Objection.
THE WITNESS: It's basically what I have been talking about. The assumption of where the point of impact was and what are we using for drag factor and the assumption of when that drag factor is acting and those kind of characterizations. I have differences of opinion with Sgt. Veppert.
By Mr. Bachmann:
Q The next page on Exhibit K here looks like you received a copy of Larry Sutherland's report.
Do you have any criticisms of his report?
MR. CALLAS: Objection.
THE WITNESS: The same thing. I think he's assuming a drag factor that I don't think exists.
Any comments about the tread depths of the tires -- I don't know what possible bearing that has on this accident. I don't know what possible bearing it has on it.
He makes some comment about economic involvement in this accident, about people who aren't -- who don't stand to gain from it. Everybody should see that that guy is guilty as sin and that sounds to me like Judge Lynch. "He looks guilty, take him out and hang him. Let's not waste time investigating this. Just take him out and hang

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him. He's a likely candidate and be done with it." I don't think that has any place in a professional report. I'm very surprised frankly.
I think Mr. Sutherland is leaning a little too hard on the curve advisory speeds for safety. AASHTO -- the last time I looked to AASHTO'S recommendation for curve speed was to essentially limit lateral acceleration experience by the occupants of the vehicle to .16G or less. That means that for this curve, if that's the criteria they were using in that curve for 35 miles an hour, it has a radius of 482 feet. If the actual drag factor of the pavement was as low as .35, excess tar of .35, you go around that curve at 50 miles an hour. If it was 0.20, you could go around that curve at 38 miles an hour.
By Mr. Bachmann:
Q Assuming that is what you are referring to. That would be exhibit T?
A Exhibit T it is.
Q It's a two-page exhibit? I've got it as a two-page exhibit.
A The second page is a calculation of the relationship between passenger car and heavy truck tire drag factor on dry pavement with a skid number of 80 at the Vehicle

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Research and Test Center in East Liberty, Ohio. The truck values were coming up as -- the unloaded trucks were coming up at 60 percent of the passenger car values, not 75 percent, not 85 percent. It was 60 percent.
Q Where is this coming from? Is it on one of the exhibits?
A You've got it there somewhere. It's the one with the chart on top. It's the second thing in there, I believe.
Q Second page of Exhibit S?
A Yes.
Q This comes from where?
A This is a summary of skid testing that was done by NHTSA, National Highway Traffic Safety Administration at the Vehicle Research -- is it Vehicle Research and Test Center or Vehicle Test and Research Center? I can't remember which way it goes. It's right out here in East Liberty, Ohio. The work was done under the direction of Richard Radlinski, R-a-d-l-i-n-s-k-i.
Those are the results from the empty tractor/trailer, from panic locked wheels stopping on dry pavement. The skid pad out there is a skid number of 80, which means it was maximum coefficient of friction of .80. Cars were coming up with .75 drag factor. .75 is pretty close to .80 and then enclosed tractor/trailers

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were coming up with .48, which was 68 percent of the passenger car value.
Q I thought you told me it was between .5 and .6 before?
A The drag factor -- the best pull is between .5 and .6. They just won't go any higher. On this surface what they got was .48, which is just under .5.
Q What's the surface again they are using?
A Dry asphalt with a maximum 1 percent and a slope skid number of 80 means it is a coefficient of friction of .80.
Q Let's go back to the first page of T.
A Okay. That's critical speed in the curve.
Q You were mentioning a whole bunch of stuff about that and frankly I don't understand what you were saying.
A Given a curve on a highway and a certain pavement, that highway and that curve have a certain radius, all right? There is a limit to the speed at which you can go around, just as we were talking about before. If you exceed that speed, you slide out of the curve. The critical speed is that threshold between following the curve and sliding out of the curve. If the curve in this accident site is posted for 35 miles an hour advisory and if it was posted in accordance with the AASHTO

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recommendation, the lateral acceleration not exceeding 0.17G, which means the drag factor has to be 0.17 or the car will slide out. If you take the 35 miles per hour speed and 0.17 drag factor, you can solve the radius of the curve. It comes up to be 482 feet.
Now if you take a curve with that radius of 482 feet and say that the pavement has a drag factor of .35, it's got excess tar. It's only got a drag factor of .35. How fast would you go around that curve that would be just on the threshold between following the curve or sliding out of the curve. The answer is 50 miles per hour.
Then I asked myself, "Well if the drag factor is 0.20, what speed can you go around the curve?" The answer is 38 miles an hour.
So if that curve has -- if the pavement has excess tar and for passenger car it's only got a drag factor of .35 we're just not including any superelevation, because I don't know anything about it. That car could go around that curve at 50 miles an hour. If I assume -- I go back to my WAG about the drag factor for heavy truck and say it's .20, the truck could go around the curve at 38 miles an hour with no difficulty. It wouldn't slide out of the curve.
Q So the 35 mile an hour advisory speed is a good advisory speed?

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A It's an advisory speed. It's based upon a comfort criteria.
Q So you have no problem with the advisory speed of that curve?
A It's not a speed limit. It's an advisory speed limit and I don't have any problem with it being an advisory.
Q You think it should be lower?
A I think we need different advisory speeds for different conditions.
Q What do you think we needed for this condition?
A Twenty.
Q Twenty?
A For excess tar on the surface maybe it would be better to be down to 20. I don't know.
Q Is that just a WAG?
A That's a WAG. At .35 for excess tar you can go around that curve at 50 miles an hour, but I don't think that's reasonable. I don't think that's sensible.
Q Have you been out to the accident scene?
A No, I haven't.
Q You have never driven it?
A No.
Q Any other criticisms of Sutherland's report?
MR. CALLAS: Objection.

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THE WITNESS: He makes statements about the surface as it existed at the time of the accident. He wasn't there any more than any of the rest of us were there. I don't see what basis he has for making that. My objection is that he offers a statement of fact rather than in his opinion.

By Mr. Bachmann:

Q Exhibit L.

A Yes.

Q Can you tell me what this is, please.

A Well on one page of it in the diagram of his original report that was sent to me, Sgt. Veppert showed the postcollision travel of the tractor/trailer as 75 feet on the first page. He did calculations. He assumed 103 feet for the distance. I'm saying which one is it?

Q Where did it come from is what you are asking?

A Which one is right? Why have we got a difference? There is some confusion because Sgt. Veppert is -- well it's just not like him to make that kind of difference. Then it's followed by a statement of mine that they must be for the center of mass and preferably for all three vehicles combined after the crash. But then I see that there is this separation of the van after the crash. I don't know how the heck you deal with that.

After reviewing it further I agree with Sgt. Veppert

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that you could do the postcollision analysis axle by axle. Again you are assuming the drag factor of each one. Well the distance they travel -- and I haven't seen what he did with that analysis, so I'm not sure whether I would accept it or not. I think he's probably using too much of a drag factor in my judgement. Then Point E on the table of coordinate measurements attached to what Sgt. Butts prepared goes with the accident report scrape mark on pavement, then he put it in editorial brackets as POI. It's being assumed that that is the POI. That's 500 feet and 9 inches from the original -- from zero. That assumption is added to our alignment of tractor/trailer at impact. Well Sgt. Veppert is assuming that they are aligned. I'm not entirely sure that's correct.

How do I identify center of mass at impact, at final position, or combined vehicles after the crash including the van? I just said that's probably not necessary. Then the last sentence says, "Does not address trailer hop or brake release," and we've talked about that before.

Q Exhibit M has Daecher on top.

A Yes.

Q This is your analysis of the questions you have of Daecher's report?

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A Yeah. Those are questions that I had. I have a lot of arguments with what his analysis assumes. For one thing, it assumes the same coefficient of friction as Sgt. Veppert of 0.69, then corrects for the gradient of .600.600. He makes no adjustment for brake adjustment, for brake efficiency, which Sgt. Veppert did do, but he doesn't.

He assumes that you have the skidmarks at 200 feet of tire marks that represent locked wheel skidding by the truck tractor/trailer, not truck tractor/trailer over the entire distance. He doesn't make any other discrimination, so he comes up with a nonsense value for the initial speed of the vehicle.

Q Down below it says Julian.

A Julian date. The 24th of 1996 was the 268th day of that year. I was just curious to see how long after the accident he had been to the accident site and it turns out to be 104 days. That's Daecher. I don't know when Sgt. Veppert was brought into it.

Q Let's go to Exhibit N, which is -- it says drag factor on top. It's a two-page exhibit.

Can you tell me what these two pages are.

A Yeah. That's playing around with the idea of what kind of drag factor, assuming there is excess tar on the surface -- which is my position in this matter -- that

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it's dry and that the initial speed is greater than 35 miles per hour. The range of values given by Baker and taken up by Fricke is 0.35 to 0.60. Do we take 75 percent of it? That would be .26 to .25. Do we take 85 percent which would be .30 to .51? We subtract the gradient and that leaves us with a range of drag factor from .17 to .42. The center of range is about .27.

Q Where do you get the 75 percent and the 85 percent?

A That's the wisdom. That's what Guiser taught.

Q That's standard in the industry?

A No. That's what they are taught at school. My position is that that is not valid.

Q What assumptions are made in the 74 percent and 85 percent?

A That truck tires are going to pull 85 percent or 75 percent of whatever the passenger car will do on that surface.

Q Why 75 percent and why 85 percent?

A I'm not sure where the numbers come from except that Ken Baker says so in his section on heavy truck accident reconstruction in that Traffic Accident Reconstruction Manual, but when you go to the skid test results in the literature, they don't come up to 75 percent. There is one where they do and that is the State of Washington. But they've got a real funny drag factor, a real low one

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for their test car on the pavement. They have .7 for a car. That's very low. Ordinary city street and country road asphalt or highways -- anywhere there is a passenger car is going to pull .75 or .75 to .78.
Q It's surprising to see anything a great deal higher or a great deal lower?
A .70 is awfully low.
Q What is the second page of this?
A The second page of it was the calculated stopping distance from 35 miles per hour and allowing perception time and response time. That's time for perception and response of 1.75 seconds. The distance traveled at 35 miles per hour while you're perceiving and responding for 1.75 seconds is 90 feet. We've been through that before. You take the time for the brake system response. It's half a second. How far is that at 35 miles an hour? It's 26 feet. So you have a total distance before the brake is applied of 116 feet.
Then assuming a drag factor of .20, how far will the vehicle travel while it's skidding to a stop. Assuming all the tires on the ground are skidding all the time from start to finish, it is 205 feet, which makes a total of 321 feet. If I say that the drag factor is .37 and hold all the other time figures the same and the initial speed the same, the total distance is 268 feet.

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Q Okay.
Is that .27 also a WAG?
A That's taken from the middle of the range. When you take 75 to 85 percent of Baker's numbers for a coefficient of friction then subtract for 99 percent downgrade, the middle of that range is .27.
Q Is that just as much of a wild-ass guess as the .20?
A Absolutely. We have absolutely not one single thing on this to rely on to tell us what to do with a heavy truck tire sliding on excess tar. Not one single test.
Q Exhibit O is your criticism of Larry Sutherland's report.
A What exhibit is that, sir?
Q Exhibit O are your criticisms of Larry Sutherland's report, correct?
A Well it becomes a criticism, yeah. I disagree with some of the things that he's done.
Q Exhibit P is the three page --
A I was just trying to compare the input Mr. Daecher was using to the input Sgt. Veppert was using.
Q Okay.
A Then some notes about the photographs showing the excess tar on the tire treads.
Q No test data?
A No test data for trucks on that surface.

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MR. CALLAS: Let's stop for a second. That article speaks for itself.
By Mr. Bachmann:
Q How does the Exhibit Q play into your analysis without going through it all?
A It's just information about what AASHTO recommendations are for setting advisory speeds on curves.
Q And R?
A That was from Mr. Soles because Sgt. Veppert is using some form of a motion equation that involves constants and Mr. Sutherland also used the form of the equation that has a beginning constant in it. I thought it was important for Mr. Soles to go through the equation for himself. The weight doesn't matter. The weight is not a factor. It is not considered a factor. It drops out of the equation, what those constants mean, what they represent.
Q Exhibits S?
A Those are copies of some charts from some of the Radlinski papers. On the first one I've drawn in the values, the percent efficiency of different strokes, chamber strokes. That's what I used for my analysis.
Q Chamber strokes of the brakes?
A Yeah, the brake chamber strokes.

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The next one is that panic stopping from 30 miles per hour on a coefficiency of friction of .80.
Q What was the purpose of this document?
A It's one of the Radlinski papers. I don't remember which it is one off the top of my head. That brake chamber is out of a Mack Service Manual. Page 3, that's another copy of that same chart from the Radlinski. There is another copy of the Mack Brake chamber size, then there are two copies that control skid from 60 miles an hour, but that's not from Mack and that's not locked wheel skidding. That's maintaining directional control since modulated braking, what we call modulated braking.
Q Heavy braking?
A It's modulated. You don't let the wheels lock up for skid control. It's modulated. You try to keep it just under lock-up. It's very tricky.
The last is the title page from the issue of Accident Reconstruction Journal or is it accident reconstruction. There is an article by a reconstructionist who's saying if you had the measurement of a trailer skip skid, you could say what the speed of the vehicle was when it laid down those skip skids to trailer hop marks. But, of course, we don't have them so we can't try that.
Q This afternoon you had to wait a while around

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in Mr. Soles' and Mr. Callas' offices here. Other than reading the newspaper you brought with you, what did you examine?
A I looked at the prints of the photographs of the accident scene that Sgt. Veppert had with him.
Q Okay.
And did you have a chance to look at his drawings?
A Yeah, I did.
Q What analysis did you perform on those?
A I didn't do any analysis. I just sat there and admired them.
Q No criticisms?
A Yeah. Again, I don't think that the position of the scrape on the road accords with the point of impact. I think the point of impact is further north than the scrape mark, so I do disagree with precrash and postcrash travel distance. I disagree with Sgt. Veppert about where the point of impact is.
Q What if it was there? How would that change your analysis?
A It wouldn't change my analysis really at all, but I don't think it's there.
Q You said that you had looked at Sgt. Veppert's expanded report.
A I just got a copy of it.

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Q What did you --
A I didn't have a chance to go through it. I got it late enough that I did not have a chance to even look through it. I see it's expanded and he's trying to explain in more detail how he did things.
Q Did you view that as a change in his opinion or just a further elaboration of his analysis?
MR. CALLAS: Objection.
THE WITNESS: In my judgement, it's an element of his methodology. I don't think there is any change.
By Mr. Bachmann:
Q What about his notes?
A Again I haven't gone through them. One set is the total station printouts for the drawing. It's a computerized surveying system that produces the drawings that I envy.
Q You wish you had the total station?
A Yeah, I wish I had it.
Q Do you use an accelerometer at all?
A I have a VC 2,000 Vericomt, V-e-r-i-c-o-m-t.
Q Did you perform any sort of skid testing using an accelerometer?
A With relation to this case?
Q Yes, sir.

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A No.
Q Are there any other assumptions that you have made in coming to the conclusions set forth in Davidson Exhibit A?
MR. CALLAS: Objection.
THE WITNESS: You mean any assumptions other than the ones that we have discussed at length here this evening?
By Mr. Bachmann:
Q Yes, sir.
A I don't really think so. I think I have articulated everything.
Q You had mentioned something about Mr. Berry's statement. What statement were you referring to?
A The one that is attached to the police report.
Q Had you seen any other statement made by Mr. Berry?
A No.
Q In your opinion, what was the cause of this accident?
A What was the cause of the accident? The vehicles were there. I don't know. All I'm saying is that the status of the brake adjustment had nothing to with it. It was not a cause. The speed could not be determined by reconstruction and there is no pervasive evidence that the speed of the truck was higher than is reasonable.

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That's basically what I'm saying.
Q You went to Carnegie Institute of Technology for two years?
A A year and a half.
Q Then what happened between 1951 and 1961?
A I worked.
Q Where did you work?
A I started working in a garage in 1952. I worked in a machine shop before that. I started working in the garage around 1952, and then for 1955 and 1956 I was in Philadelphia doing alternative service work as a warehouseman and driver. Then I went back to become a mechanic. It's all in the resume in painful detail.
Q The question I had is if you got your Master's in history -- which there is nothing odd about that. That's wonderful.
A How does it apply to traffic accident reconstruction?
Q Yes.
A Every one of them is a historical reconstruction that happened in the past. We weren't there, but another different body of data was. The rigorous logic has to be the same or just as rigorous.
Q But was that just something you did out of intellectual interest?

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A I was always trying to figure out what I was going to be when I grew up. I think more to the point of this is Page 3, which are certifications as a master automobile technician, as a truck technician, as a master heavy-duty truck technician, and as a traffic accident reconstructionist.
Q In 1972 that looks like that's really the first time when you start -- what were you doing in 1972? Were you an automotive investigator for the Bureau of Consumer Affairs?
A Yeah, that's what I was doing. I was doing consulting work in forensic automotive mechanics on a part-time basis.
Q Can you tell me what you were? I'm not really sure what it was you were doing.
A You mean my full-time job?
Q You said you received several newspaper reports, articles, and journals. Did this have anything to do with what you are doing today?
A It had to do with motor vehicles, yes. I had to occasionally go out to examine vehicles and determine what the problems were and then try to get them resolved.
Q So --
A It was not traffic accident reconstruction, if that's what you're asking.

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Q At what point did you get involved in accident reconstruction?
A The first case I ever worked on was in 1969. It wasn't a traffic accident on the highway. It was an accident at a loading dock, but it required the same kind of analysis. What happened and why. Who shot John.
Q In your resume here you have repair technician, entertainment electronics, and small appliances from 1967 to 1972. I'm just trying to figure out --
A Well if you go to the next page you'll see that from 1967 to 1977 I was engaged part time as a consultant in forensic auto mechanics.
In 1977 I transferred to that as my full-time occupation, which has been since that time.
Q From 1969 to 1977, was that just doing that on your own or with somebody else?
A I have always been on my own. I had a helper for a while, but that didn't work out.
Q So in 1969, you started doing accident reconstruction?
A Essentially, yes. I didn't realize it at that time, but that's what it was. I did it from time to time from that time on and bought some books and studied them and so forth. Then in -- I think 1986 I took my first formal course in traffic accident reconstruction. It was a

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short course with the Kent State University taught by Dr. Uhrich, then went on from there.
Q Can you give me names of some of these prosecutors that you have worked with in the past several years, the ones that are still in that business?
A I'd have to go back to the files and try to pull the names. I don't remember off the top of my head.
Q Are there any insurance carriers that you work with on a regular basis?
A No. They call me when they want me, State Farm or American States or who knows what. I'm doing one for Erie Insurance Group right now. I haven't done any work for them for several years.
Q In terms of -- and pardon me. I haven't studied your resume. It's very lengthy in terms of accident investigation.
Do you have any training, background, and education in that?
A Yeah.
Q Can you tell me where and when.
A I took some courses from Northwestern in measuring at the site of traffic accidents, mostly so I could understand what the police officers were doing in their reports, what their numbers meant.
I basically did it well and satisfied Northwestern

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that I was ready to take traffic accident reconstruction and that I didn't have to go back to square one and start with traffic accident investigation, because I had been doing it for a number of years.
Q Are you a tool maker?
A Am I a tool maker?
Q Yes, sir.
A Not in any professional sense. I used to make a lot of stuff when I worked on the line as a mechanic and made tools for myself in that profession. It wasn't in the sense of making machine tools.
Q It looks like you've got a lot of continuing education at Kent State University and the Traffic Institute.
A Yeah. Most of the meetings at the American Academy of Forensic Science are at least half a day. The Engineering Science Program has motor vehicle cases.
Q Recognized programs for accident reconstruction-type things would be --
A Specifically, yeah.
Q -- like at Northwestern University?
A Yes. There were seminars where I ran into Sgt. Veppert.
Q Or like the program at the University of North Florida?

A Yeah. That was actually held in Maryland, but it was taught by someone from IPTM.
Q You recognize those as –
A They are worth listening to.
Q People are trained there as –
A Yes. I don't agree with everything they teach at all, but I they are worth listening to.
Q People who are trained at either Northwestern or North Florida are qualified and certified by those –
A You're asking me with respect to Sgt. Veppert's certification as a traffic reconstructionist. The answer is yes. It's a hell of an examination. It's not to be – to put him on your logs there.

MR. BACHMANN: I think I'm done, but I am going to stretch my legs for a few minutes.

(Thereupon, a recess was taken.)

By Mr. Bachmann:
Q Mr. Davidson, I found in your file some additional photographs and here's a packet, for example.
A I can just characterize all of them as being taken after the accident. A lot of them are out of focus. They are not real good and clear. I didn't pay a whole lot of attention to any of them. I was much more interested in the actual at-scene photographs, the ones

taken right then and there.

MR. BACHMANN: We're done.

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(Thereupon, the deposition was concluded at 8:42, p.m.)

- - -

I, JO DAVIDSON, do verify that I have read this transcript consisting of one-hundred eight (108) pages, and that the questions and answers are correct.

_____
JO DAVIDSON

Subscribed and sworn to before me this _____ day of _____, 1997.

_____ Notary Public.

My commission expires

CERTIFICATE

STATE OF OHIO,)
) SS:
SUMMIT COUNTY.)

I, Melissa Karm, a Notary Public in and for the State of Ohio, duly commissioned and qualified, do hereby certify that the within named witness, JO DAVIDSON, was by me first duly sworn to testify the truth, the whole truth and nothing but the truth in the cause aforesaid, that the testimony then given by him was by me recorded in stenotype in the presence of said witness, afterwards transcribed using computer-assisted transcription; and that the foregoing is a true and correct transcription of the testimony so given by him as aforesaid.

I do further certify that this deposition was taken at the time and place in the foregoing caption specified, and was completed without adjournment.

I do further certify that I am not a relative, counsel or attorney of either party, or otherwise interested in the event of this action.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal of office at Akron, Ohio on this 31st day of December, 1997.

_____
MELISSA KARM, Stenographic Reporter and Notary Public for the State of Ohio.

My commission expires November 29, 2000.

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LAWYER'S NOTES

PAGE	LINE	