ORIGINAL

DOCUMENT FOLDER

COMMONWEALTH OF PENNSYLVANIA

PUBLIC UTILITY COMMISSION

Application of Consolidated Rail Corporation For Approval of the abolition of a grade separated crossing where SR 0068 and/or SR 2023 cross over the below grade East Brady Tunnel between mileposts 70.0 and 70.5 in Brady and/or Madison Townships, Clarion County, Pennsylvania. : Docket No. A-00116297

Further Hearing.

William T. Seybert v. Consolidated Rail Corporation Complainant states at SR 0068 and SR 2023, a railroad tunnel has deteriorated to hazardous conditions and for the public interest, safety and well-being, the tunnel should be sealed at both ends to prevent people from walking or driving vehicles through this hazardous situation in Madison Township, Clarion County. : C-00981956

Further Hearing.

DOCKETED

JUN 29 2001

Pages 203 through 476

State Office Building
Hearing Room 1
300 Liberty Avenue
Pittsburgh, Pennsylvania

Thursday, June 7, 2001

Met, pursuant to notice, at 10:03 a.m.

BEFORE:

MICHAEL A. NEMEC, Administrative Law Judge

APPEARANCES:

WILLIAM CLANEY SMITH, ESQUIRE
7800 Perry Highway
Pittsburgh, Pa. 15237
(For William T. Seybert)

RECEIVED
01 JUN 28 PM 1:48
PA.P.U.C.
SECRETARY'S BUREAU

APPEARANCES (Continued):

JOHN G. WALL, ESQUIRE
Burns, White & Hickton
120 Fifth Avenue, Suite 2400
Pittsburgh, Pa. 15222
(For Conrail)

JASON D. SHARP, ESQUIRE
P. O. Box 8212
Harrisburg, Pa. 17105-8212
(For the Pennsylvania Department of Transportation)

GWILYM A. PRICE, III, ESQUIRE
120 South McKean Street
Butler, Pa. 16001-6029
(For Allegheny Valley Land Trust)

MARTHA R. SMITH, ESQUIRE
Pennsylvania Department of Transportation
Seventh Floor, 400 Market Street
Harrisburg, Pa. 17105-8767
(For the Department of Conservation and Natural Resources)

DAVID A. SALAPA, ESQUIRE
P. O. Box 3265
Harrisburg, Pa. 17105-3265
(For the PUC Bureau of Transportation and Safety)

HENRY R. POPE, III, ESQUIRE
10 Grant Street
Clarion, Pa. 16214
(For Madison Township and Clarion County)

WITNESS INDEX

WITNESSES	DIRECT	CROSS	REDIRECT	RECROSS	VOIR DIRE
John Dennis Lasko					
(By Mr. Wall)	209	---	292	---	---
(By Mr. Smith)	---	235	---	294	---
(By Mr. Pope)	---	287	---	296	---
(By Mr. Sharp)	---	---	---	---	---
(By Ms. Smith)	---	---	---	---	---
(By Mr. Price)	---	---	---	---	---
(By Mr. Salapa)	---	---	---	---	---
Gordon Elliott					
(By Mr. Wall)	297,306	---	---	---	---
(By Mr. Smith)	---	352	---	---	304
(By Mr. Price)	---	421	---	---	---
(By Mr. Sharp)	---	423	---	---	---
(By Ms. Smith)	---	426	---	---	---
(By Ms. Salapa	---	---	---	---	---
John Stanley Blose					
(By Mr. Sharp)	430	---	---	---	---
(By Mr. Smith)	---	455	---	462	---
(By Mr. Price)	---	459	---	---	---
(By Ms. Smith)	---	---	---	---	---
(By Mr. Wall)	---	---	---	---	---
(By Mr. Salapa)	---	---	---	---	---
Donald J. Hull					
(By Mr. Salapa)	464	---	---	---	---
(By Mr. Smith	---	469	---	---	---
(By Ms. Smith)	---	---	---	---	---
(By Mr. Price)	---	---	---	---	---
(By Mr. Wall)	---	---	---	---	---
(By Mr. Sharp)	---	---	---	---	---

EXHIBIT INDEX

NUMBER		FOR IDENTIFICATION	IN EVIDENCE
Conrail			
1	(Report of stability of Tunnel)	214	429
PennDOT			
3	(5-page narrative report, 3-page description of photo shoot, with 12 photos and set of highway drawings)	438	455
4	(Photos)	451	455
5	(Photos)	451	455
6	(Photos)	453	455

Any reproduction of this transcript is prohibited without authorization by the certifying reporter.

P R O C E E D I N G S

ADMINISTRATIVE LAW JUDGE MICHAEL NEMEC: This morning we have a further hearing in the Case of William Seybert vs. Conrail and the consolidated Case of Application of Conrail. The Complaint is at C-00981956, the Application at A-00116297. The purpose of this further hearing is to receive any additional testimony and information that any of the parties wish to present. And that's pursuant to Paragraph --- ordering Paragraph 11 of the Commission's Order in this consolidated proceedings.

Before we start, I'm going to ask counsel that are present to identify themselves and state for the record the parties they represent. We'll start with attorney W. C. Smith.

MR. SMITH: William Claney, C-l-a-n-e-y Smith, S-m-i-t-h, representing Mr. Seybert.

JUDGE NEMEC: Okay. Mr. Wall?

MR. WALL: John G. Wall, W-a-l-l, with the Pittsburgh firm of Burns, White & Hickton, representing Conrail.

JUDGE NEMEC: Mr. Sharp?

MR. SHARP: Jason D. Sharp, representing the Commonwealth Department of Transportation.

JUDGE NEMEC: Mr. Price?

MR. PRICE: Gwilym, G-w-i-l-y-m Price, representing Allegheny Valley Land Trust.

JUDGE NEMEC: Ms. Smith?

MS. SMITH: Martha Smith, representing the Department of Conservation and Natural Resources.

JUDGE NEMEC: Mr. Salapa?

MR. SALAPA: David Salapa, representing the Commission's Bureau of Transportation and Safety.

JUDGE NEMEC: Any other counsel present?

MR. POPE: Henry Pope, representing Madison Township and Clarion County.

JUDGE NEMEC: Alright.

Conrail/Norfolk Southern have witnesses to present. I know that PennDOT does. Who wants to go first? Mr. Smith, are you going to present any witnesses today?

MR. SMITH: I may towards the end, or I may not have to. Depends on how the testimony goes.

JUDGE NEMEC: Okay. Fine.

MR. WALL: It matters not to me. Do you want me to go first, Jason?

MR. SHARP: It doesn't matter.

JUDGE NEMEC: Okay. Let's go with Conrail/Norfolk.

MR. WALL: Okay. Thank you, Your Honor.

We would call John Lasko.

JUDGE NEMEC: Okay, Mr. Lasko, come on up here. We have a special seat for you.

(Witness sworn.)

Whereupon,

JOHN DENNIS LASKO

having been duly sworn, testified as follows:

DIRECT EXAMINATION

JUDGE NEMEC: Okay. You may proceed.

MR. WALL: Thank you, Your Honor.

BY MR. WALL:

Q Kindly state your full name, spelling your last name.

A John Dennis Lasko, L-a-s-k-o.

Q Could you please raise your voice a little bit, 'cause the room's kind of filled here?

A Okay.

Q Could you please indicate by whom you're employed?

A Michael Baker, Jr. Incorporated.

Q And where is that business located?

A In Beaver, Pennsylvania.

Q And in what capacity are you employed by Michael Baker, Jr. Incorporated?

A I'm a Senior Geologist.

Q Could you kindly provide for us a brief educational history, going in chronological order, for ins --- for each institution from which you received a degree? Start with your secondary or high school days.

A In 1980, I graduated from high school from Greater

Latrobe. In 1985, I graduated from Juniata College, with a Bachelor of Science Degree in Geology. In 1989, I graduated from California University of Pennsylvania, with a Masters in Earth Science.

Q Since receipt of your Masters Degree in Earth Science in 1989, could you give us an employment history? And let's please continue in chronological order through the present; from '89 through the present.

A In November of 1989, I was employed by Michael Baker, Jr. Incorporated as a Geologist. That was until 1998, October.

Q Okay. Let me just --- let me just stop and ask you about that --- that tenure as a Geologist at Michael Baker Incorporated, Inc., that spanned from '89 to '98. What type of projects were you involved in?

A Chiefly, major transportation projects, such as highways, bridges and tunnels.

Q And what would you do? What type of geological services would you provide, with regards to those major transportation projects?

A My --- my main responsibilities were development and implementation of subsurface investigations for those transportation projects.

Q Okay. And, following your tenure at Michael Baker, from '89 to '98, where were you next employed?

A With the Commonwealth of Pennsylvania, Department of Transportation, District 11, Allegheny County.

Q For what period of time?

A October of 1998, to approximately, October of '99.

Q Okay. And, during that approximate one-year period of time, what did you do for PennDOT?

A Again, mostly transportation projects. As a Geologist, I was mainly responsible for reviewing geological and geotechnical engineering reports for the Fort Pitt Tunnel Rehabilitation Project.

Q Okay. So, you primarily were involved with that Tunnel Project, is that correct?

A Right. That --- that took up most of my time.

Q Okay. And why did you leave PennDOT in October of '99?

A I got a better offer with Michael Baker ---

Q Okay.

A --- (Continuing) --- because I went back --- I went back to Baker.

Q Okay. And, what type of position did you have when you --- when you returned to Baker?

A A Senior Geologist position.

Q Okay.

A Which I'm at now.

Q Okay. And you continue in that through the present?

A Correct.

Q And, what type of work do you do as a Senior Geologist?

A Mainly overseeing the development and implementation of these subsurface investigations, as long --- as far as geologic reconnaissance, subsurface interpretation of geologic conditions for bridges, highways and tunnels.

Q Okay. With regards to the --- the tunnel projects, you've already indicated you had involvement with PennDOT and the Fort Pitt Tunnel Project. How about with Baker? What are some of the --- you --- you don't have to list them all, but what are some of the tunnel projects you had involvement with, in a capacity as Geologist, when you worked with Baker?

A The two main ones were for the West Busway. One was the Barry Street Tunnel, which is a 200-year-old, brick-lined tunnel, that was rehabbed, that connects Ingram to Sheridan. I was mainly responsible for the subsurface investigation for that tunnel. And the other tunnel in that Project was the Wabash Tunnel, which was rehabbed also, for the West Busway.

Q Okay. This subsurface investigation when dealing with tunnels, why is that important?

A It's really important to know the geology you're in. You need to know what type of rock, so that the engineers --- so we can relate that information to the engineers, so they can design, especially in tunnels, ground improvements. As

they're driving that tunnel, they need to know what rock they're in.

Q Okay.

A So, as that --- as that design progresses, they need to know where they're going to encounter certain types of rock.

Q Are you authorized to testify on behalf of Conrail at today's proceedings?

A Yes, I am.

Q Okay.

MR. WALL: I would offer this witness for cross-examination as to his qualifications as a Geologist.

JUDGE NEMEC: Any questions on qualifications?

ALL: No, Your Honor.

JUDGE NEMEC: Thank you. You may proceed.

MR. WALL: Thank you, Your Honor.

BY MR. WALL:

Q Mr. Lasko, I'm going to ask you a series of questions related to the East Brady Tunnel. And, I would ask that if, in response to any of those questions, you --- you proffer or give us any opinions, I would ask that you only do so within a reasonable degree of certainty as a Geologist. Would you agree to do that?

A Yes, sir.

Q Okay. I'm ---

MR. WALL: With Your Honor's permission, I will give the witness what has been marked as --- what we will mark as Conrail Exhibit Number 1.

JUDGE NEMEC: I assume that's the report that he coauthored?

MR. WALL: Yes, Your Honor, and that was --- as Your Honor's aware, we had circulated this to all the parties well in advance of the hearing. If I may approach and ---

JUDGE NEMEC: You may, and it may be so identified.

(Whereupon, the document was marked as Conrail Exhibit 1 for identification.)

MR. WALL: I --- I do have extra copies. Does anyone need another? Okay.

BY MR. WALL:

Q Mr. Lasko, could you identify what was marked as Conrail Exhibit Number 1?

A Yes. This (indicating) is the report that I co-authored with Mr. Gordon Elliott.

Q Okay. And, the portion authored by you relates to your geological survey of this area, is that correct?

A Yes.

Q Taking a look at your report, and in particular the area under "Geological setting," could you please describe for His Honor and all those present at today's proceedings, what

efforts were undertaken by you to evaluate the geological setting of this Tunnel?

A First we did a literature review, which is obtaining all the available geological and geotechnical information for the area, which is generally obtainable through the State Geologic Survey for the USGS. There's a lot of geologic information that's already mapped and attainable. And we did a literature review and reviewed the information. And then we did a two-day reconnaissance and field survey.

Q That literature review, what type of information are you availed of when you do this?

A There's --- there's all --- already been mapping of a lot of these geologic units, so there's available geologic maps and reports explaining what the units are.

Q Okay. And, you indicated that you did a --- a field reconnaissance, as well?

A Correct. It was a two-day field reconnaissance, to go out and confirm what we had seen in the literature review, go out in the field, walk along the slopes. And then we also did a field survey, with --- to survey the Tunnel, as far as location.

Q Okay. So, that was --- those efforts were to ascertain what type of rock through which this Tunnel was honed, or --- or runs, is that correct?

A Yeah. The main objective is to identify marker

beds, which are rock units that are generally very widespread in the Southwestern Pennsylvania area. So, once you've identified those marker beds, you can locate yourself stratigraphically, as far as what rock unit you're in.

Q Okay.

A That was a major endeavor.

Q I --- I --- did you prepare any exhibits that are included with the report that's marked as Exhibit --- Conrail Exhibit Number 1?

A Yes. Figure 2, Figure 4 and Figure 5.

Q. Let's take those one at a time. If I could direct your attention to Figure Number 2, there appears to be a topographical map at the top. Is that --- is that what that is?

A Yes. That's a standard USGS topo map.

Q What area's depicted on that map?

A The East Brady Tunnel, which is the dash line that goes through the R in Riverview.

Q Okay. Very good.

And the --- there's an indefinite boundary listed there. Do you know what that signifies?

A That's a Township boundary that's on the map. It's a boundary between Brady and Madison Township.

Q Okay. And there's a 68 with a circle around it, and it passes through that, what appears to be, I guess, a red and

white dotted line on that top figure, on Figure Number 2. What is that?

A That's the location of State Route 68.

Q And similarly, below that, there's a 2023 with a circle around it, that appears to run through a roadway on this map. What does that depict?

A That's State Route 2023.

Q Okay. Alright.

Could you --- I'd like to direct your attention to the --- the photograph, below that, on Figure Number 2. What area's depicted in that photograph?

A The same area that the topographic map covers. That's an aerial --- that's an aerial photograph.

Q Oh, okay, of the same area?

A Yes, of the same area.

Q Now, when you say, "topographical map," this --- this shows the contouring of the land, is that correct?

A Right. Those lines that are indicated on there, you see the number 1000 and 1432?

Q Uh-huh.

A Those lines are --- are elevations of equal --- equal elevation.

Q Okay. So, they ---

A Above sea level.

Q Okay. So, basically, the crest of the hill is ---

is shown by the --- the smaller circles near --- near the center of this map, is that fair enough?

A Correct.

Q Okay. Alright.

Back down to the --- the photograph, still on Figure Number 2, there appear to be a couple of bald spots, if you will, on the terrain there. can you see those?

A These areas here (indicating)?

Q Yes. On the photographs, there appears to be one that Route 68 runs through, in the center of the photograph and then another one further to the right of the photograph. Do you see those two bald spots, if you will?

A Yes.

Q What do they signify?

A Those are areas of reclaimed strip mine, for the Upper Freeport Coal.

Q Okay. So, there --- they were strip mining activities, right?

A Yeah. Surface mining, correct.

Q When you say, "the Upper Freeport Coal," what do you mean?

A Well, it's a marker bed that very well known. It's a coal seam that's minable. It's roughly, 3 to 6 feet thick. It's a good commercial quality.

Q Okay. And that's on the high --- it's found in the

higher elevations only, in this area?

A Yeah, only at the highest elevations. Approximately, 1360 to 1340.

Q Okay. So, at --- at the crest of this hill, right here (indicating)?

A Right.

Q Okay. When you did your geological study here or evaluation of the area, did you find any evidence of any deep mining or shaft mining?

A Yes, we did, but it's --- it's way off this photo. It's greater than 2000 feet to the east.

Q On ---

A There's a deep --- there's a deep mine in the Upper Freeport Coal.

Q Okay. Do any of the branches of that mine pass within 2000 feet of this --- this Tunnel?

MR. POPE: Objected to unless foundation be laid for knowledge of that fact.

MR. WALL: I think that he's already indicated that he's reviewed the --- the surveys of the mines in the area. So, I believe that is ---

JUDGE NEMEC: Well, he can reiterate that.

MR. WALL: Okay.

BY MR. WALL:

Q. Did you conduct an investigation into deep mines in

the area?

A Yes, we did.

Q And what did you --- what did that entail?

A That the only deep mine that was indicated by the McMurray Office, was greater than 2000 feet to the east of the Tunnel.

JUDGE NEMEC: Okay. McMurray Office of?

THE WITNESS: Of the District Mining Office of the Department of Environmental Protection.

JUDGE NEMEC: Okay.

BY MR. WALL:

Q And when you say, "2 ---" "more than 2000 feet to the ---" "to the east of it," by that, do you mean that there's no branches than run in any area beneath this photograph?

A There was no evidence of that.

Q Let's take a look at the next exhibit you prepared. And that is Figure Number 4. If you'd be kind enough to go to that. There appear to be a series of a couple of photographs or --- that are joined together in the upper, right-hand corner; one photograph in the lower, right-hand corner and a chart on the left-hand side. Could --- let's just take then one at a time. Could you explain what the chart is on the left-hand side?

A The chart on the left is a stratigraphic column.

Q What is that ---

A That's ---

Q --- (Continuing) --- in layman's terms?

A It's a column of geologic units, from the highest to the lowest elevation on the project site.

Q On this particular area?

A Correct.

Q Where are --- where do the levels of the Tunnel fall ---

A If you ---

Q --- (Continuing) --- with regards to these various formations here?

A If you look in the bottom, right-hand corner of that --- of that column, you're going to see an S and an N. That refers to the north and south portal.

Q Okay. So ---

A Those are the lowest elevations.

Q So, these various rock formations or units or groups, are located above the --- the --- the elevation of the Tunnel, is that correct?

A Yes.

Q Okay. Alright.

You had mentioned the Upper Freeport Coal earlier, as being appropriate for commercial mining. Why is that?

A Well, it's --- it's thick enough. It's --- it's

three to six feet thick, and generally, they don't deep or strip mine anything that's less than 32 inches. It's just not worth going after.

Q Okay. And where is that Upper Freeport Coal found in this location of this Tunnel?

A Well, it's well above the Tunnel.

Q Okay. So, it's basically at the highest ---

A It's at the highest --- it's at the highest elevations.

Q Okay. So, that would correspond with Figure 2 in those photographs, showing where that coal was ---

A Correct.

Q --- (Continuing) --- taken from. Okay.

A That's probably why they strip mined it, because it was so close to the surface.

MR. POPE: Your Honor, I'm going to object to any answers that this witness is giving, concerning mining opinions and stripability or the marketability of coal seams. I don't think he's been qualified as a mining engineer, and I'd ask that any answers that he's given that suggest that he is, concerning what is stripable and minable, be stricken from the record.

MR. WALL: I think as a Geologist ---

JUDGE NEMEC: The objection is noted.

MR. WALL: --- (Continuing) --- he's qualified to

testify to that.

JUDGE NEMEC: Well, but he hasn't testified that he's done any evaluations or analysis for any coal mining operations or --- or any commercial extraction of coal.

MR. WALL: Okay.

BY MR. WALL:

Q In your --- let me go back and I'll cover it and then we'll move on.

As part of your studies and degree --- the various degree programs in which you've been involved, have you studied coal formations as they exist in Western Pennsylvania?

A Yes.

Q And, as part of those studies and the degrees that you obtained, did you --- did your academic undertakings touch upon or relate to the minability or the commercial --- the minability of --- of the various different types of coal formations in this area?

A Yes. There's Economic Geology classes that you --- that you take.

Q And you've taken those?

A Yes.

Q And you're familiar with --- with ---

MR. POPE: Objected to as a leading question, Your Honor.

JUDGE NEMEC: Overruled.

BY MR. WALL:

Q So, as part of your --- as part of your academic career, did you --- you have engaged in studies as to the minability of different coal formations, is that correct?

A I wouldn't say, "studies," but, there --- there's general literature that discusses minability of coal, especially the --- the --- the mapped seams, like the Upper Freeport.

Q Okay. So, you're --- you're familiar with that formation?

A Correct.

Q Okay.

MR. WALL: Your Honor, I would ask that we ---

JUDGE NEMEC: You may continue. I'll take the objection under advisement and deal with it with regard to the weight to be given to the testimony. I'm not too concerned about it because I don't --- right now, I don't see any great relevancy, but go ahead.

MR. WALL: Okay. There's no need for me to go back and re ---

JUDGE NEMEC: No.

MR. WALL: Okay. Very good. Thank you, Your Honor.

BY MR. WALL:

Q The --- the --- on the chart depicted on the left-hand side of exhibit or Figure Number 4 that we've been discussing, through what formations is the --- the Tunnel at

issue herein situated?

A The Tunnel was predominantly driven through the Lower Connoquenessing Sandstone and the Mississippian Mauch Chunk formation.

Q The photographs in the upper, right-hand corner of Figure Number 4, what do they depict?

A That is the existing cut slope at the south portal of the East Brady Tunnel.

Q When you say, "cut slope," what do you mean?

A That slope was excavated approximately, 86 years ago, when they dr --- when they drove the Tunnel through the hillside.

Q Okay. That's --- that's at the south portal?

A Correct.

Q And, what can you tell us about the --- the --- the vertical profile of that?

A That slope is near vertical. It was excavated near vertical. It's 86-years-old. And it's still --- still vertical.

Q And what --- how is that of any relevance?

A Well, for being excavated that long ago and it's still holding its verticality, it's pretty stable.

Q Okay. Alright.

Taking a look at this colored photograph, the same colored photograph, can you identify various formations that

appear there?

A The --- the Lower Connoquenessing Sandstone's in the lower --- the lower picture. That's a fine grain to course sandstone.

Q Uh-huh.

A You'll see in the upper --- upper left photo, you'll see a dark band in the center of that photo.

Q Uh-huh.

A That's the Quakertown Coal.

Q Okay.

A And just above that ---

Q And that would be about an inch from the top of the photograph?

A Correct.

Q Okay. And I'm sorry, I interrupted you, go ahead.

A And above that dark bank, you're going to see another sandstone and that's the Upper Connoquenessing Sandstone.

Q Okay. So, these are all --- and the various bands are identified off to the side of that photograph, is that correct?

A Yes.

Q Okay. Now, where would the level of the --- that's at the south portal. Where would the --- the south portal be located?

A The south portal would be directly to the left of those photos.

Q Of the lower photograph?

A Yes.

Q If you would. Pretty much right above where it says, "Lower Connoquenessing Sandstone?"

A Correct.

Q Alright. And the photograph down beneath that, what does that depict?

A That is the existing cut slope at the north portal of the East Brady Tunnel.

Q And again, cut slope is what?

A That slope's been excavated.

Q Okay.

A So that --- to drive the Tunnel through.

Q Okay. And where would the northern portal be indicated, with regards to the --- the rock depicted on that photograph?

A It would immediately be to the right of that photo.

Q Okay. At the lower end of it?

A Yeah, at the lower end, to the right.

Q Okay. Very good.

And what is --- can you describe for us what you see in that --- that --- that photograph, the various formations and the like?

A Well, you'll see that sandstone at the very top. It's kind of --- kind of lenticular.

Q What does that mean?

A It's lensed. It's thinning.

Q Okay.

A That's the Lower Connoquenessing Sandstone.

Q Okay.

A And just below that, you'll sort of see some color banding in there, red, it's like red. Can you see?

Q "Color banding," what is that?

A Well, that's --- that's the color --- the bands of color that you see going through the rock.

Q Okay. Alright.

A And that's the Mauch Chunk formation.

Q Okay.

A It's mostly shale and claystone.

Q Okay. Very good.

What are "marker beds?"

A Marker beds are geologic units that have been extensively mapped, as far as structure and elevation. The three --- the three particular on this site, are the Upper Freeport Coal, the Vanport Limestone is another one and the Brookville Coal is another one.

Q Okay.

A But generally on coals and limestones. The

limestones because most of the limestones are marine and there's fossils in them.

Q Uh-huh.

A And the other limestones that are in the units are fresh water and there's no fossils. So, you can --- you can depict these pretty readily in the field ---

Q Okay.

A --- (Continuing) --- when you find the fossils.

Q And the marker beds, how are they --- how do they aid in --- in mapping out the geology of an area?

A As I said, they're --- they're mapped extensively by structure. So, they have elevations on these units, either on the top or the bottom of these units. So, based on elevation above sea level, you'll be able to locate these units.

Q The --- the photograph down below on Figure Number 4, that relates to the --- the rock surface at the northern portal, describe how that appears, you know, what's the vertical properties of that or the slope of that?

A That slope is again, near vertical. And it was excavated 1915, so, it's approximately, 86-years-old. And again, holding its verticality that long, it's --- it's fairly stable.

Q Let's move on to Exhibit Number 5. I think they're referred to as Figure Number 5 of Conrail Exhibit Number 1, I apologize. Let's take a look at the --- the --- the lower ---

what appears to be a map. Can you describe what that is?

A That's an enlargement of the topographic map that you saw on Figure 2. The dash line represents the East Brady Tunnel, where it passes through the R. That red --- that red line --- the red dash line is the --- is SR 68.

Q Okay.

A What --- what you're seeing there's, as far as the A's go, that's a section line.

Q A section line. What's a "section line" mean?

A Well, if you were to take a slice of that hillside --

Q Uh-huh.

A --- (Continuing) --- cut it out of that photo, plan view, raise it up and lay it flat, you would see the section AA line that you see above.

Q Oh, okay. So, that's basically if you were to take a cross section of the land, from the A to the other A down below, you would --- you would find what appears above, is that fair?

A Correct.

Q Okay. Describe for us what appears above in that Figure 5, the diagram above.

A The diagram above is the Section AA line. It's the elevation line of that hillside. The blue --- the blue line is the Tunnel. The blue dark line is the Tunnel.

Q That elevation in feet, is that above sea level?

A Yes.

Q Okay. Alright.

So, the --- the --- the Tunnel is depicted in --- in blue, is that correct?

A Yes.

Q And there's two types of sandstone identified there.

A The stra --- what that's showing is the stratigraphic location of the Upper and Lower Connoquenessing Sandstone. So, going from the south portal, as the Tunnel was driven through, it was predominantly in that Pottsville, Upper Connoquenessing and Lower Connoquenessing Sandstone. And as it achieved the north portal, you can see that's it's in --- it's in the Mauch Chunk formation, which is the pink below.

Q Okay. Very good.

The 68 and the 2023, what are they --- to what do they relate?

A They --- that's the location of the State Route 68 and State Route 2023.

Q And, I guess the dif --- the elevation of those two State Routes, above the Tunnel, would be depicted in looking at the differences in the elevation, is that fair?

A Right. SR 68's roughly, 503 feet above the Tunnel and 2023 is roughly, 363 feet above the Tunnel.

Q Okay.

I'd like to go --- go back to your --- your report. And thank you for reviewing those. And there's two groups that we're dealing with here: The Pottsville group and the Mauch Chunk formation. Is that what you testified to?

A Yes.

Q Okay. Describe for us the Pottsville group.

A The Pottsville group is a --- is a light gray, fine grain to course conglomeritic sandstone. Now, what I mean by "conglomeritic," it has a lot of large pebbles in it, a lot of large rock fragments ---

Q Uh-huh.

A --- (Continuing) --- during it's deposition. It's generally very well bedded, and what I mean by that is, it has distinct beds. They can be thick, anywhere from several inches to several feet in thickness.

Q Okay.

A There's a thing that occurs in rocks called "jointing."

Q What is that?

A Which is a crack in the rock, where along no --- no displacement has occurred. It occurred during deposition. All rocks have cracks.

Q Okay.

A The cracking in the rock can be measured as far as spacing.

Q Which is what?

A Which its horizontal limit, through the unit. And in the Pottsville ---

Q I don't understand that. Could you go back one second and tell me, is that the distance between the cracks?

A The distance between cracks, yes.

Q Okay. Alright.

A The horizontal distance between the cracks.

Q Sort of like joints in a sidewalk?

A Correct. Exactly.

Q Okay. Alright.

Go ahead and tell us about those --- those distances between the cracks here.

A The joints in the Pottsville are generally wide to moderate. And what I mean by wide is 3 feet to 10 feet in width, and moderate is like 2, 2 to 3 feet in width. So, every 3 to 10 feet, you're going to have one of these joints.

Q Okay.

A Generally.

Q Alright. Can you describe for us the --- the Mauch Chunk formation, through which a --- a --- well, let me back up.

Could you quantify for us the --- or give us some sort of insight as to what portion of this Tunnel passes through the Pottsville group, as opposed to the Mauch Chunk?

A Well, if you look back at Figure 5, you're going to see that predominantly the Tunnel is driven through the Pottsville Sandstone.

Q Okay. Alright.

And the Mauch Chunk formation, can you tell us what that --- can you describe that --- that type of rock?

A The Mauch Chunk is characteristically shale and --- and claystone, which is finer grain --- finer grain rocks, softer rocks.

Q Okay.

A They tend --- they tend to be clo --- more closely jointed, two inches to two feet. That's just due to the --- the softness of the rock. The more resistant rocks, like the limestones and the sandstones, tend to have wider joint spacing.

Q Uh-huh.

A And the shales and the claystones and the coals tend to have very --- very close spacing.

Q Okay.

The geological setting of this particular Tunnel, is it --- what is your opinion, as to whether or not it's suited for tunneling?

A Well, it's about the best you're going to find in Western Pennsylvania. I mean, you're not going to find anything better to tunnel through.

MR. WALL: I have no further questions. Some of the other folks may have some cross-examination for you.

JUDGE NEMEC: Okay. Who would like to start?

MR. PRICE: I have no questions, Your Honor.

JUDGE NEMEC: Okay.

MR. SMITH: I'm going to have some questions.

JUDGE NEMEC: Go ahead.

MR. SMITH: Is there anybody else who wants to proceed?

CROSS-EXAMINATION

BY MR. SMITH:

Q Sir, you mentioned that you did a subsurface investigation, is that correct?

A For?

Q For this particular --- well, a subsurface investigation is part of your responsibility in your job function, is that correct?

A Correct.

Q How does drilling relate to subsurface investigation?

A How does drilling?

Q Yes.

A Drilling is the main --- main means of attaining samples for the --- for the subsurface investigation. That's the method --- the method that you would use to go ---

Q How --- how do they do that?

A How do they drill?

Q Yeah.

A They get a drill rig and they get a core barrel and they sample down through the soil layer. And once they get on to rock, then they begin a coring process, which is a --- a hollow bit tube that cores down through the rock, and you have a sample that comes up inside the barrel, which can then be broken off and put in a box and logged.

Q How deep do they usually go, or how deep can they go, when coring?

A Well, as deep as you want. As deep as your --- as you want to go.

Q Go 100 feet?

A Yeah.

Q 200 feet?

A We recently drilled for the Mon River Bridge, and we went 200 feet, easy. I've drilled down through Mt. Washington. That's 350 feet. So ---

Q Okay. Can you go 500 feet?

A Probably.

Q Now, you have two intersections here, 68 and 2023, indicated on your Figure 5, is that correct?

A Yes.

Q Did you use a surface drill to do any core sampling?

A We did not drill from the surface, no.

Q Why not?

A There's enough rocks exposed on the hillside, that you can --- you can see what units you're in.

Q The most accurate way you can determine what the geology is, is by a core sample, is that correct?

A That's one of the ways.

Q Is that the most accurate way?

A Probably the most accurate.

Q But you didn't use the most accurate way, is that correct?

A We used the best way that we --- we felt was the rock --- map the rocks on the --- on the slope.

Q You used the cheapest way, is that correct?

A I wouldn't say the cheapest. It was --- it still cost money to do.

Q But you didn't use the best method, to determine what the geology was at the point of these intersections, is that correct?

A We didn't drill down through the hillside, no.

Q And drilling through the hillside is the best method, is that correct?

A I wouldn't say it's the best method.

Q Is there anything that's better?

A Besides opening it up as a rock cut.

Q So, subject to opening the whole thing, dig 300 to

500 feet deep ---

A Right.

Q --- (Continuing) --- core sampling is the best method?

A It's the most available method, yes.

Q That's not --- I'm not asking you about available methods. Apparently, that's the best method, other than open pit --- open cuts, is that correct?

A I wouldn't say it's the best method.

Q Well, what is the best method?

A It's a combination of --- of everything you're doing on the project. You need --- you have to have field reconnaissance, you've got to have literature reviews, you've got to look at ad --- existing information, you have to --- it's a combination. It's not just one element. It's a combination.

Q Is there any more accurate method that can be utilized, other than core drilling at the site of these intersections, to determine what the actual geology is, at that point?

A No, not below the road.

Q There's no better method?

A No, no better method.

Q Did you do any drilling?

A Not from the surface, no.

Q Where did you do drilling?

A I didn't --- I didn't do any of the drilling.

Q Who did the drilling?

A Mr. Gordon Elliott did the probe holes.

Q Okay. So, the only drilling that was done, was probe holes from the inside of the Tunnel, is that correct?

A Correct.

Q And the maximum depth or maximum length of those probe holes was how much?

A I wouldn't know. You'd have to ask Mr. El ---

Q Did you read the report?

A Yeah, they're probably 10 --- 10 --- 10 feet; 8 to 10 feet.

Q And that includes the walls of the Tunnel, is that correct?

A Right. So, you generally get a two-foot liner. So, you get about 8 feet beyond the liner.

Q So, that doesn't disclose the geology there at all, does it?

MR. WALL: Your Honor, I think we've gone beyond the scope of his direct examination.

MR. SMITH: His direct ---

MR. WALL: We're into an area now, we're talking about the internal inspection and the probe holes that were done by the individual that will testify next on behalf of Conrail.

JUDGE NEMEC: Yeah, I understand that.

Go ahead, Mr. Smith. I'll permit a few more questions.

BY MR. SMITH:

Q Okay. The probe drilling does not disclose the geology, at all, is that correct?

A It --- it discloses the geology immediately behind the tunnel liner.

Q And the liner was --- do you have any idea how long --- how deep the liner was in places?

A I'm not sure I understand the question.

Q Do you understand how thick the liner was, in different places?

A There's only two places that it was drilled, so, that was approximately, two feet.

Q And where were those two place, relative to these crossings?

A They're right beneath where the two roads intersect the alignment of the Tunnel.

Q And how many feet is that from the entrance to the Tunnel?

A Approximately, 800.

Q 800 Feet. So, you looked at the geology 800 feet away, and then drew conclusions from that, is that correct?

A Well, you've got to remember, this is flat lying sedimentary rock, so that ---

Q I ---

MR. WALL: Let him finish, please. He asked ---

JUDGE NEMEC: I think --- I think there's some confusion in the question.

MR. SMITH: Would you read ---

JUDGE NEMEC: No. You asked --- you're --- you mean --- your next question is that --- that you looked at the geology 100 feet ---

MR. SMITH: 800 feet.

JUDGE NEMEC: Yeah. Oh, from where you drilled?

MR. SMITH: That's correct.

JUDGE NEMEC: Okay.

MR. SMITH: I'll phrase this again.

MR. WALL: I would ask, Your Honor, that he allow the witness to finish the answer, as opposed to cutting him off, and he's done it a couple of times. And I'm just sort of ---

MR. SMITH: I'll try and be more courteous in my questions. Thank you.

MR. WALL: Thank you, Your Honor. Thank you, Mr. Smith.

BY MR. SMITH:

Q Your actual geological observation of the strata was 800 feet away from the point of these crossings or intersections, is that correct?

A Yes.

Q And so, you're attempting to interpolate that

geology, relative to the crossings, themselves, is that correct?

MR. WALL: Object to the form.

BY MR. SMITH:

Q Are you trying --- did you, in your study, attempt to interpolate something from 800 feet away, relative to what the geology was at the crossings?

MR. WALL: Same objection.

JUDGE NEMEC: Overruled.

THE WITNESS: That --- that's what geology's all about. It's flat lying sedimentary rock. You expect --- you expect it to be flat lying.

BY MR. SMITH:

Q When you drilled down through Mt. Washington, as you mentioned, why did you drill from the top down?

A We were doing a slope evaluation.

Q A slope evaluation of what?

A Of the Conrail Shelf.

Q Pardon me?

A Of the Conrail Shelf. It was more of a rockfall --- a rockfall analysis.

Q And you felt that that would give you more accurate --- let's see. That Commonwealth Shelf that you were talking about, that's a straight cut down, isn't it?

A Pretty much. It's a natural slope.

Q Okay. Pretty much as the cut as shown at this Tunnel?

A Pretty much.

Q And you found that it was important or significant, to actually go back and drill a core, to determine what the actual geology was, is that correct?

A To help us, to supplement our --- our field reconnaissance, 'cause we repelled down with survey equipment and actually surveyed Mt. Washington, surveyed the units.

Q But to accurately determine the geology, you found it was necessary to do a core sample, is that correct?

A Pretty much.

Q Wasn't it necessary to do a core sample here in this case?

A I wouldn't think you'd need one.

Q Would it have given you the most accurate information?

A Yes. It would give you more information.

Q Why didn't you use the most accurate method of determining the geology?

A Costs.

Q Costs? In other words, if you were to go out again and spend some money, you could give to this Court the most accurate information available, is that correct?

A You're talking about some expensive drilling.

That's over 500 feet.

Q I didn't ask you about how much it cost, but that's the most accurate way of doing it, is that correct?

A As far as accuracy, yes.

Q And that's why it's a general practice to do core drilling, is that correct?

A It gives you more information, yes.

Q So, your opinion today is based on incomplete information, is that correct?

MR. WALL: Object.

THE WITNESS: Well, it's not incomplete.

JUDGE NEMEC: Sustained.

BY MR. SMITH:

Q Your conclusion or your opinion today is based on less the most --- than the best method of determining this geology, is that correct?

MR. WALL: Object.

JUDGE NEMEC: Overruled.

THE WITNESS: It's based on the information that's available.

BY MR. SMITH:

Q I'd say, it's --- but you didn't have all the information that was available, is that correct?

A We'd didn't have the subsurface core drills, no.

Q Okay. And you didn't --- so, you didn't have the

best information available?

JUDGE NEMEC: This is getting repetitive.

BY MR. SMITH:

Q You used the term "geotechnical." Are there people who are concerned --- considered to be geotechnical experts?

A Yes. Recent --- in recent years, yes.

Q Okay. You're not in that category, is that correct?

A No, I'm a Geologist.

Q Is there anyone here today to testify in behalf of the railroad, as a geotechnical expert?

A I would say yes.

Q Who?

A Dr. Elliott.

Q Dr. Elliott is an expert in geotechnic --- well, you're --- you're not testifying as a geotechnical expert, are you?

A No.

Q You said in your direct testimony that it's important to know the geology, in offering an opinion, is that correct?

A Yes, you need to know the geology.

Q You --- you don't have any --- any assurance, in the absence of the core drilling, that that's the most accurate geology, is that correct?

JUDGE NEMEC: Asked and answered, sir.

MR. SMITH: Pardon me?

JUDGE NEMEC: That's been --- you're --- you're being ---

MR. SMITH: Okay. Now, I'll withdraw that.

JUDGE NEMEC: Please.

BY MR. SMITH:

Q You were asked, concerning your testimony as a Geologist, that you would testify as to a reasonable degree of certainty. Could you tell us what you mean or what you understand "reasonable degree of certainty" to be?

A What you --- what you expect to encounter, based on your information.

Q Encounter? I thought you were testifying as to the geology?

A Right. Well, as far as what geology you're going to encounter along the Tunnel.

Q Well, if you did not use the best method of determining geology, how can you testify as to a reasonable degree of certainty?

A If you stand at the north and south portals, you know what rocks you're in.

Q You see two different things at the north and south portals, is that correct?

A That's because of the geology.

Q But you did --- you had an opportunity --- there's a methodology for determining the geology at these

intersections, and that's the core drilling, correct?

A Yes.

Q That would give you the most certainty, is that correct?

A Below the road, yes.

Q And that's what we're dealing with today, is that correct?

A Yes.

Q So, you did not have and did not utilize the devices which are available in your field, to determine a reasonable degree of certainty, is that correct?

MR. WALL: Object.

JUDGE NEMEC: Sustained.

BY MR. SMITH:

Q Would the use of core drilling at the intersections improve the accuracy of your opinion?

MR. WALL: Object. Asked and answered.

JUDGE NEMEC: Well, you know, he hasn't expressed an opinion with regard to the --- the issue regarding --- with --- as to what's going to happen to this Tunnel if it's left as is. I'm not sure what his opinion is, other than to --- to explain to us what the geology of this area is.

What --- what opinion were you referring to? Let's be more specific.

MR. SMITH: Well, he's testifying as to the geology at

the intersection.

JUDGE NEMEC: I understand.

MR. SMITH: And ---

JUDGE NEMEC: And he's explained that these are flat lying beds, and that you --- typically, in his experience, you look at one --- one layer, and if you go to another area and you see the same --- the same recurrence of --- of rock formations, you can assume that those predominate all the way through the --- the --- the hillside, through the hill.

MR. SMITH: But he's ---

JUDGE NEMEC: I believe that's his testimony.

MR. SMITH: But he has also testified, as I understand it, that the best method of determining the geology at the intersections, in that location, is by core drilling.

JUDGE NEMEC: Yes, sir, you've established that beyond any doubt.

MR. SMITH: Thank you.

BY MR. SMITH:

Q Now, would the core drilling --- you were asked about reasonable certainty. Would the use of core drilling affect the certainty of your determination of the geology at the point of these intersections?

A No.

Q You mean if you had a direct core drilling through this intersection, it would not affect your concept of the

geology?

A I don't think it would.

Q Why?

A Because it's been so extensively mapped that, it would just give us additional information, more accurate elevations, but it wouldn't change my degree of certainty, that what's in that hillside is what --- what we saw --- what we're seeing at the north and south portal.

Q But you didn't --- you did not attempt to utilize the best method for determining the highest degree of certainty?

JUDGE NEMEC: That's been asked and answered, sir.

BY MR. SMITH:

Q Now, when you were working for Michael Baker, they're a --- they're used extensively by PennDOT, is that correct?

A One --- that's one of the DOT's, yes.

Q And do they do work involving road --- highway collapses and analyses and ---

A Yes, on occasion.

Q Is this an area where you've been involved?

A Yes.

Q Are you familiar with the collapse of a section of the --- southern section of I 79?

MR. SHARP: Objection, Your Honor. I think we're beyond

the scope of the witness's testimony. No foundation has been laid.

MR. WALL: I would agree.

JUDGE NEMEC: Overruled. Go ahead.

BY MR. SMITH:

Q Are you familiar with a collapse of part of I 79, south of Pittsburgh ---

MR. WALL: Object.

BY MR. SMITH:

Q --- (Continuing) --- involving ---

MR. WALL: Go ahead, I'm sorry.

BY MR. SMITH:

Q --- (Continuing) --- a subterranean excavation.

MR. WALL: Object. I think that's ambiguous, in that "familiar" could reading a newspaper account working on the project.

JUDGE NEMEC: Okay. We'll --- we'll refine the question to --- to --- to the extent of asking whether you been professionally involved with any examination or investigation to the cause or explanation for the collapse of I 79.

THE WITNESS: No, I have no involvement.

BY MR. SMITH:

Q You know if Michael Baker did?

A You'd have to be more specific about ---

Q The collapse of a mine tunnel crossing I 79, south

of Pittsburgh, resulting in the collapse of part of I 79, south of Pittsburgh.

MR. WALL: Your Honor, I would object to any question along this regard.

MR. SMITH: This is ---

MR. WALL: Please allow me to finish this time.

JUDGE NEMEC: Well, but, I understand ---

MR. WALL: He's had no involvement in it professionally.

JUDGE NEMEC: That's what he just said.

MR. WALL: If other people associated with that firm had involvement with it, he is not the proper individual to --- to testify to that. It's impossible ---

JUDGE NEMEC: That's a valid point. Thank you.

MR. SMITH: His knowledge in the field, Your Honor and in the area in which he's doing business and his expertise and with the --- with PennDOT and work they perform for PennDOT, I think relates to his qualifications and his understanding and his knowledge of the area, and especially his knowledge of the --- the area, in relation to collapsed subterranean excavations.

JUDGE NEMEC: That all may be true, but he's --- he's answered your question. He doesn't know about it.

MR. SMITH: Thank you.

BY MR. SMITH:

Q My understanding of reasonable degree of certainty,

do you attach any percentage to probability of certainty and probability of error?

MR. WALL: Objection. I think it's an inappropriate question, Your Honor. I don't think that it's --- it's required that any witness --- the --- the question was asked to qualify him as an expert and to qualify his opinion testimony.

JUDGE NEMEC: Well, the --- it's a --- it's a question counsel's using to evaluate the --- you know, what --- what he means by "reasonable," so, I'll permit it.

BY MR. SMITH:

Q Do you understand the question?

A I think what you're asking me is what percentage, you think, if I had to throw a number out, would what we anticipate, as far as geology, that we're presenting in this report, what percentage, as far as accuracy. I'd say 90.

Q 90. So, does that mean whether or not there's a possibility of a collapse of this Tunnel?

JUDGE NEMEC: He hasn't testified to that, sir.

MR. SMITH: I'm asking him, relative to ---

JUDGE NEMEC: But he hasn't testified to that. That's not a fair question.

BY MR. SMITH:

Q Well then, you're saying there's a 10% possibility that your evaluation of the geology is in error, is that

correct?

A If you --- if you look at it that way, yes.

Q How did you arrive at the 10%?

A Off the top of my head.

Q Off the top of your head. In the field, is there any field in which you engage in this profession, is there any percentage reference made to a reasonable degree of certainty?

A You're talking about probability analysis, and, no, we don't --- we don't do that.

Q You don't. So, you have no probability analysis as to whether or not this Tunnel might collapse, at the point of these intersections?

JUDGE NEMEC: He's not discussed that in his direct testimony, sir, so, I'm going to not permit the question. You have another witness you can talk to about that.

MR. SMITH: Thank you.

BY MR SMITH:

Q When you were there on your 2-day reconnaissance, was there a fence in the location there?

A Excuse me?

Q When you were there on your 2-day reconnaissance, was there a fence obstructing the access to either of these portals, or in the area where you took the photographs?

A A fence, yes.

Q Was part of that fence demolished?

A I don't remember.

Q You don't recall?

A No.

Q You didn't take any pictures of the portal, itself?

A They're in the report. I think it's Figure --- I think it's Figure --- Figure 3.

Q You're right.

Now, at the north portal, to the right, it looks to me as though there's no fence there, is that correct?

A According to the picture, no.

Q Did you take the pictures?

A This particular picture? Yes.

Q And you didn't even notice whether the fence was missing, although the photograph shows that the fence is missing?

A It was a while ago.

Q And what date was that?

A The date of the reconnaissance. That had been early --- early --- early '90 --- '99?

Q '99?

A Early 2000, I mean. Excuse me.

Q Early 2000. You have an accurate date for that reconnaissance?

A I don't believe it's in the report.

Q Did you evaluate the interior drilling report?

A Did I evaluate it?

Q Yes.

A I didn't evaluate it. I just read it.

Q You read it. Did you use it in forming any of your opinions?

A Opinion on? My opinions as to the geology?

Q Yes.

A Yes. I looked at the probe holes.

Q You didn't consider the Tunnel geometry, is that correct? You were not involved in that?

A No.

Q Now, you mentioned that you relied on the McMurray Office for evidence of deep mining, is that correct?

A Yes.

Q Is it true that the McMurray Office does not have complete records on deep mining?

A I don't know that.

Q Did you mention you found evidence of mining?

A Based on what they gave me.

Q Based on ---

A What --- what the McMurray Office gave us.

Q Well, didn't you say that your physical examination of the surface indicated that there was ---

A Oh, yeah. That there was some strip surface mining, yes.

Q Okay. And how about some of the strata? Was there some mining in the strata?

A Mining of the strata?

Q Yeah, the exposed mining. It's my recollection, I may not be right, but, I thought you indicated in your report, field re --- the field --- on page 3, "the field reconnaissance of the hillside, in the vicinity of the tunnel, did reveal evidence of very small, unrecorded entries into the coal seams." Page 3, first full paragraph, last 3 lines of that.

A Oh, yeah, there's --- those were little punch mines. Little punch mines. Little, two-three foot excavations into the mine. Private residents probably did it.

Q Well, you don't know who did it, do you?

A Right, don't know who did it.

Q That was mining, is that correct?

A A form of mining, yes.

Q How exhaustive was your review of the surface, relative to the existence of small mines?

A It was only in the area of the --- of the north and south portals.

Q So, you don't know --- you didn't make an attempt to determine whether or not there was any other evidence of any other small mines in the area, is that correct?

A Not outside the limits of the Tunnel, no.

Q Now, you discussed the north portal and the south portal and you discussed the Mauch Chunk level of their strata, is that correct?

A Yes.

Q There seems to be a dis --- difference in the strength of the two strata, is that correct?

A Yes.

Q Okay. And, why is that significant?

A Why is that significant? Well, when the tunnelers drove that Tunnel through, to adjust their ground improvements, they need to know what type of rock they're in. So, they probably had one ground improvement to work through the hard sandstone, and as they transitioned into the Mauch Chunk, they would need another ground improvement.

Q Well, the first thing that you said was "probably," is that correct?

A Yeah, I wasn't even born then, when they put this Tunnel in.

Q I know, but you --- there were two drill holes made in the sidewalls, is that correct, on the inside of the Tunnel?

A Two drill holes?

Q Yeah.

A Okay.

Q Is that correct?

A Yes. Correct.

Q You were familiar with that?

A With the probe holes, yes.

Q Why didn't they determine what the --- the geology was, relative to the Mauch Chunk, by doing additional probe holes on the inside?

A I'm not sure what that would tell you. I'm not sure where ---

Q Well, it's a weaker strata, is that correct?

A Yeah, but it's 86-years-old and in a vertical cut.

Q I just asked you --- would you please answer my question, rather than give me some other answer?

It's a weaker strata, is that correct?

A Yes. I already answered that.

Q Now, how much weaker is the strata than the Pottsville?

A A quantified or a --- or a qualitative?

Q Both.

A Quantitative, I don't know. Qualitative, the shales and claystones are less resistant and the sandstones are more resistant.

Q So, you have no idea then, quantitatively, what the bearing capacity is or the bridging capacity is of the Mauch Chunk, in this particular location?

A I don't know.

Q Is there anyplace in the report in which that's determined?

A I don't think so.

Q So, no one has determined whether or not that's sufficient to avoid a collapse, is that correct?

MR. WALL: I'll object again.

JUDGE NEMEC: Sustained.

BY MR. SMITH:

Q To your knowledge, from the studies conducted, in re --- and observations made, in your work on this particular project, no one has ascertained whether or not the Mauch Chunk strata here is sufficient to avoid a collapse?

MR. WALL: Object again.

JUDGE NEMEC: Sustained.

BY MR. SMITH:

Q Why are joints important?

A Joints are important because it's a reflection of the stability of the rock. The closer the joints, the less stable. The wider the joints, the more stable. Generally.

Q You say the "closeness of the joints." There's two things involved in the joints, is that correct? That --- that would be the length of the stone involved, between --- and the distance between joints and the width of the joints, themselves, is that correct?

A Yes.

Q Did you determine what the width of the joints was?

A Yes.

Q How did you determine that?

A Measured them in the field.

Q Pardon me?

A We measured them in the field.

Q Where did you --- how did you measure them in the field?

A Along the cut slopes. You can see them on the cut slopes.

Q Oh, I see. But you didn't measure them in relation to the intersections, is that correct?

A There's no --- there's no way of doing that. You have to physically see the rock to measure the joint. Core drilling wouldn't even tell you where the joint was.

Q So, you have no idea, at the point of this intersection, what the distance is?

MR. SMITH: I don't know whether counsel here is nervous, but I notice him moving his head from side to side.

MR. SALAPA: And?

JUDGE NEMEC: And? I mean, I've been moving my head from side to side, too.

MR. SMITH: Well, every time I ask a question, he's moving his head in a negative fashion. Now, no offense intended. It may be just a nervous tick.

MR. SALAPA: Mr. Smith, if you are accusing me of prompting the witness, I will take great offense at it.

MR. SMITH: I'm not.

MR. SALAPA: I'm shaking my head at your questions.

MR. SMITH: Well, I would appreciate that you maintain a neutral attitude in shaking your head. No offense, personal offense intended. I'm sitting here. Every time I ask a question ---

JUDGE NEMEC: Let's continue, Mr. Smith, please.

BY MR. SMITH:

Q You have not ascertained then, as part of this report, the actual crack situation, at the point of these intersections, is that correct?

A There's no way of actually seeing them, but the way these joints work, they work in sets. And they're usually parallel. And they're continuous. Once you establish what the joint set is, it generally follows that pattern throughout the unit.

Q But, if someone blasts a tunnel, that can change the crack structure adjacent to the tunnel, is that correct?

A It could.

Q Were these Tunnels blasted, to your knowledge?

A I have no idea.

Q If there is a physical attempt to, either by impact or blasting, to carve out this Tunnel, will either method, or

can either method affect the crack situation?

A Yes.

Q And you did not determine --- was this something you'd reasonably expect to happen?

A With --- with tunneling?

Q Yeah.

A With blasting?

Q Yeah.

A I have not expertise in that area, blasting.

Q Well, you --- well, how about impact?

A As far as hammering on the rock, yeah, you'll crack it, if you hit it hard enough.

Q Would it be reasonable to believe, that at the time of construction of these Tunnels, that the cracks were affected by the construction?

JUDGE NEMEC: I --- you know, I --- we're going to --- we're going to end this right now. I mean, obviously, within the vicinity of where the drilling or --- or --- or --- or explosions occur, it's going to affect the area immediately around it. But to --- but to --- to --- to assume that that's going to affect the whole geological structure of --- of everything above it, is just preposterous. And if that's what you're implying, let's not continue with this.

MR. SMITH: In --- in all due respect, Your Honor, we have two aspects: What it was done imme --- and where this --

- where this --- these locations are, these stratas are.

JUDGE NEMEC: He wasn't --- number 1, he wasn't there. Number 2, he --- he's in --- indicated he doesn't have experience with --- with tunneling, either by impact or by explosives.

MR. SMITH: He has testified already ---

JUDGE NEMEC: You know, you're free --- you're free to bring in your own tunneling expert. Okay?

MR. SMITH: I'm entitled to question ---

JUDGE NEMEC: You are. And he's s --- he's answered your questions, at length.

MR. SMITH: Well, my understanding is, that his answer is, that impact from hammering will crack ---

JUDGE NEMEC: A rock, yes. I mean, that's something that I --- I can --- I could testify to, sir.

BY MR. SMITH:

Q Now, you did not determine then what the cracks were, at --- at the site of these ---

JUDGE NEMEC: Asked and answered. Before you even finish the question. At the --- he has not determined what the --- the crack spacing was directly beneath the two state highways. That's correct.

BY MR. SMITH:

Q Now, why is the crack spacing important?

A I think I already answered that.

Mr. WALL: Asked and answered, Your Honor. I'd object.

BY MR. SMITH:

Q Then, are the cracks a source of fil --- infiltration of water?

A Yes. That's a secondary porosity of the rock, yes.

Q Can that affect the stability of the Tunnel or the geology?

A The water?

Q Yes.

A Yes.

Q And how does that do that?

A Hydrostatic pressure.

Q Did you find any evidences of hydrostatic pressure in your studies?

MR. WALL: Objection, Your Honor. It's beyond the scope of his direct examination, and that will be addressed.

JUDGE NEMEC: Well, it --- it's in the report.

MR. SMITH: It's in the report.

JUDGE NEMEC: And the --- I assume the other witness is the person who will be addressing the hydrostatic pressure.

MR. SMITH: Well, the only way I can find out is by asking, Your Honor.

JUDGE NEMEC: I understand that.

BY MR. SMITH:

Q Is it my understanding that you did not consider the

hydrostatic pressure, relative to your evaluation?

A Not in my work.

Q Okay.

Now, how close is the Mauch Chunk --- what is the proximity of the Mauch Chunk strata, to the top of the Tunnel?

A To the top of the Tunnel?

Q Yes, to the top of the arch.

A The north portal's entirely in the Mauch Chunk.

Q It is? And that's the weaker of the two, is that correct?

A Yes.

Q And that's where you see at the --- is that at the north portal?

A Yes.

Q And that's where the collapse is, around the entrance of the Tunnel?

A Yes, I believe that's where the collapse --- there's a hole there.

Q Does that collapse have anything to do in relation to the Mauch Chunk strata?

A No, because that collapse is outside the --- the Tunnel.

Q I mean --- I just ---

A It's outside --- it's outside the hillside.

Q I'm having a little difficulty understanding that.

There's a --- an entrance ---

A There's a trough that comes down the hill, right to that north portal. Where that collapse is, you can go up and stand on it. There's nothing above you. It's on the outer extent of the hillside. It's not --- it's not in the depth of the Tunnel.

Q Did you find evidence, when you physically pre --- were present, yourself, of the existence of water on the inside of the Tunnel?

A There is water flowing along the invert of the Tunnel, yes.

Q Did you find water coming through any holes in the ceilings or walls?

A My investigation did not --- did not involve looking for water leaking through the Tunnel.

Q Did you look for any?

A No.

JUDGE NEMEC: Sir, just let me interrupt. You used the term "invert of the tunnel." What do you mean by "invert?"

THE WITNESS: The floor.

BY MR. SMITH:

Q In your --- in your investigation, you didn't find any evidence of any water above the level of the floor of the Tunnel?

MR. WALL: Objection. Asked and answered.

JUDGE NEMEC: Overruled. Go ahead.

THE WITNESS: There's water in the hillside, yes.

BY MR. SMITH:

Q Well, where is there water in the hillside?

A Generally, in the coals and limestones. As it infiltrates down, it tends to be captured in those units, due to --- due to underlining confining layers.

Q So, there's water that percolates down towards this Tunnel, through these strata that --- to which you referred, is that correct?

A Yes.

Q Did you attempt to quantify that?

A No.

Q Why not?

A Well, it's outside the scope. I was just doing the geologic setting.

Q You were just doing the geology. Do you know if anyone else did --- the reporter working with you on this project?

A Quantify the amount of water in the hillside?

Q Yes.

A Not that I'm aware of.

Q Do you know if anybody attempted to quantify the hydrostatic pressure?

A Mr. Elliott evaluated that.

Q If the cracks were enlarged, or if more cracks were induced by construction, would that reduce the capacity of either of these two strata to support the ground above it?

A Sure. If you --- if you get more cracks --- you got more cracks, it's going to be less thin.

Q Would you expect that this Tunnel would be able to be constructed, without inducing or creating additional new cracks?

A I don't know their method --- method and means of --- of constructing the Tunnel, so, I could --- can't answer that.

Q Would you expect cracks to be introduced in the construction of the Tunnel on these two strata?

A To be introduced?

Q Yes. By construction.

A Possibly.

Q Wouldn't it be more accurate to say, "probably?"

A The words mean the same to me.

Q They do? Probably and possibly mean the same to you?

Does that also relate to your ideas concerning reasonable degree of certainty?

MR. WALL: Objection, Your Honor.

MR. SMITH: I don't know. We're talking about probabilities.

JUDGE NEMEC: Overruled.

THE WITNESS: I'm not sure how to answer that question. Yes, there's a probable chance that what's in that --- what's in that hillside.

BY MR. SMITH:

Q Do you know what that percentage of chance is?

A I don't --- I have no way of quantifying that.

Q So, if you have no way of quantifying it, you can't testify to it as a reasonable degree of certainty, is that correct?

MR WALL: Objection, Your Honor.

JUDGE NEMEC: Sustained.

BY MR. SMITH:

Q Now, the Mauch Chunk strata, does that affect both intersections or both road crossings?

A I don't believe it affects either one. 68.

Q 58?

A The --- the Mauch Chunk is beyond --- beyond the limits of where the --- I mean, it's below the Tunnel where --- in the --- in the area where 68 and 2023 cross the alignment.

Q How close is the Mauch Chunk in proximity to the top of the Tunnel, in terms of feet?

MR. WALL: Top of where? At what location?

MR. SMITH: The arc --- the arc of the Tunnel.

MR. WALL: And beneath 68?

MR. SMITH: Let's say and beneath 68.

MR. WALL: To the top or the bottom?

MR. SMITH: Well, we'll start right at the beginning, and we'll walk through the tunnel. Starting at the south portal.

BY MR. SMITH:

Q What is the elevation of the Mauch Chunk strata above the arc of the Tunnel, as constructed by the railroad?

A It's below --- it's below the invert.

Q You're saying the Mauch Chunk is beneath?

A Yes.

Q The floor?

A Yes.

Q Now, in relation to the intersection, itself, where's --- what is the relationship of the Mauch Chunk?

MR. WALL: What intersection?

MR. SMITH: The first intersection to the south, which would be ---

MR. WALL: 2023 or ---

MR. SMITH: 2023. Okay?

THE WITNESS: It's beneath.

BY MR. SMITH:

Q Okay.

Now, relative to 68, is it above the Tunnel?

A It's probably in the sidewalls.

Q Pardon me?

A It's in the sidewalls.

Q In the sidewalls. Are the sidewalls important for the support of a tunnel --- of the strata above the Tunnel, itself?

A I'm not a tunneling engineer. I can't answer that.

Q Well, if there's a difference in strength, would that difference in strength relate to supporting the geological strata above?

MR. WALL: Objection, Your Honor.

JUDGE NEMEC: I'm sorry?

MR. WALL: I said I would object to that question.

JUDGE NEMEC: Okay. It's overruled. Answer.

THE WITNESS: The engineers would have to design for that.

BY MR. SMITH:

Q Well, when you looked at the --- you say the Mauch Chunk, which is a weaker strata, sort of a loose conglomerate, in some instances, is on each side of the Tunnel, itself, supporting the strata above the Tunnel, is that correct?

A Yes.

Q Okay. Now, the strength of this column or this wall supporting the strata above the Tunnel, would that affect the strength or the capacity to sustain that upper strata?

MR. WALL: Objection, Your Honor.

JUDGE NEMEC: Overruled.

THE WITNESS: It would have to be considered in the design, sure.

BY MR. SMITH:

Q Well, would it be considered in the geological --- geologically speaking, would it affect the capacity to support the strata above?

A Sure. You know the weaker unit's there, but you design for it.

Q I'm just asking you geologically, not design.

A What are you asking me, that if --- if that rock above can be supported by the rock below?

Q No. I asked you, is it weaker --- the weaker strata affect the capacity to support the strata above?

A I already answered that. I said, yes.

Q Okay. Thank you. That's the answer I wanted to finally get to.

Which parts of this report did you prepare?

A The Geologic Setting. Page --- the bottom of page 2, 3.

Q On page 4, first full paragraph, you state, "It would appear that the tunnel was excavated under largely favorable conditions in blocky sandstone over much of its length, and in shale and claystone in the northern third." Is that correct?

A Yes.

Q Is that part of your work?

A That's the conclusion, yes.

Q Now, what is the implication of it being excavated through shale and claystone in the northern third?

A The engineers would have to design their ground improvements, based on what type of rock they were in.

Q Well, geologically speaking, in terms of strength and stability, is there less stability and strength --- and strength, in shale and claystone?

A I think I answered that already. Yes.

Q And, does this have a re --- okay. Would this affect the capacity of this material to sustain the overhead strata?

A Would what affect it, its strength?

Q Yes. The shale and claystone.

A Yes.

Q And what intersection does the shale and claystone affect?

A What intersection?

Q Yes.

A There's shale and claystone all --- all the way up through the 500 feet. I mean, it's --- you're talking about one unit, but there's other shale and --- and softer units even --- you know, there's claystones everywhere.

Q Okay. We were talking about ---

A You're talking about the Mauch Chunk?

Q No, we're talking about the northern third ---

A Okay.

Q --- (Continuing) --- where you say that it was excavated through shale and claystone.

A Right.

Q Now, what part --- what intersection does that affect?

A 68.

Q 68. So, 68 would have a higher probability of collapse as --- under normal ---

MR. SHARP: Objection, Your Honor. No foundation has been laid for that question.

JUDGE NEMEC: Sustained.

MR. WALL: I move to join.

BY MR. SMITH:

Q Is the shale and claystone in position, in the northern third of this Tunnel?

A Yes.

Q And is it called upon to --- does it actually sustain, or is it called upon to sustain the strata above it?

A Yes.

Q And it is of lesser strength than that which is drilled through the other part of the Tunnel, is that correct?

A It's weaker rock, yes.

Q And you say that it's a function of engineering to compensate for that lesser strength, is that correct?

A Yes.

Q And you have no personal knowledge as to whether or not that has been compensated for, is that correct?

A Yes.

Q You have not been called upon by counsel here to express any opinion, is that correct?

A I ---

JUDGE NEMEC: Opinion regarding what, sir?

BY MR. SMITH:

Q Your study.

A I ---

MR. WALL: I'd object.

JUDGE NEMEC: He's expressed an opinion with regard to the geology of the area. That's relied on in the report. But if you're talking about an opinion with regard to the collapse of the Tunnel, I believe that's the next witness.

MR. SMITH: I think that if he's called as an expert, he has to have an opinion, and the opinion has to be offered. And, to my knowledge, in his testimony and the questions asked, although he dis --- discussed reasonable degree of certainty ---

JUDGE NEMEC: Sir, that --- that's something that, you

know, we have the transcript, something you can argue.

MR. SMITH: Well, I was going to make a motion to strike his testimony.

JUDGE NEMEC: It's denied.

MR. SMITH: Can I complete my motion?

JUDGE NEMEC: No.

MR. SMITH: Thank you.

BY MR. SMITH:

Q In determining the existence or non-existence of subsurface mines, did you --- and the history of the area, did you communicate with any of the neighbors or people living within the area?

A No.

Q Is there any reason for that?

A I wasn't in contact with any --- anybody.

Q Well, in an evaluation of this type, when you have knowledge of the fact that all subsurface mines are not recorded in McMurray and you see evidence of subsurface mining, wouldn't you find that normally, in your profession, you would make inquiries?

MR. WALL: Object to the form of the question.

JUDGE NEMEC: Overruled.

THE WITNESS: Typically, we don't.

BY MR. SMITH:

Q You don't. Are there Geologists who do?

JUDGE NEMEC: No, that's --- that's speculative. It's --- it's objectionable.

BY MR. SMITH:

Q Now, you made reference in your report, to a coal chute seen above the south portal. It's on page 2, second line from the bottom.

JUDGE NEMEC: Yes, and that's a --- that's an interesting observation, because it's something that we talked about at the prior hearing. Go ahead, ask your question.

BY MR. SMITH:

Q Okay. Have you focused your attention on that part of the report?

A Yes.

Q That's your part of the report?

A Yes.

Q Okay. Why did you conclude that this appeared to be a coal chute?

A 'Cause there was coal fragments in the chute.

Q Oh. Where were they coming from?

A From that --- that coal seam that you see in that picture.

Q Oh, I see. You didn't tell us before, that that coal from that picture, had been put into the chute, or that the chute ran to the open mining, did you?

A No.

Q So then, what we have here, is evidence of a subsurface mine, with a coal chute being utilized to extract the coal, or to transport the coal, is that correct?

A That's what was speculated, yes. It was either that, or just for --- to convey water, as it states in the report.

Q Did you make any local inquiry concerning that chute?

A Only talked to Conrail.

Q Only to Conrail.

Was there anybody in particular who was able to illuminate you on this coal chute?

A No.

Q How many openings did this coal chute service?

A There was only one, little --- one, little area, right there.

Q Would that little area be a source of water infiltration into the hillside, or could it be?

A It would be an exit out of the hillside, yes.

Q Could it infiltrate water into the area of the Tunnel?

A Sure.

Q Would that affect the strength of the geology within the Tunnel, itself, in the Tunnel area?

A Yes, water has impacts.

Q Did you ascertain the extent of the impact, in this instance?

A It was me --- it was beyond my geology scope.

Q Do you know whether or not the report approaches that or treats that?

A Mr. Elliott talks about the water in his sections, yes.

Q Did he talk about the water in relation to this specific mine entry?

A I think he talks about the water in general, on the site.

Q But not specifically and relative to this opening?

A Not that I'm aware of.

Q Can water of that type develop hydraulic pressure in the hill?

A I'm not sure of the question.

Q You talked about hydraulic pressure before, is that correct?

A Hydrostatic.

Q Hydrostatic, okay.

A Hydraulic's a different --- that's --- you're getting into two different ---

Q Hydrostatic is a hydraulic expression of ---

A Correct.

Q --- (Continuing) --- using water. Hydrostatic

pressure, you talked about that?

A Yes.

Q Could that influence --- could this opening to the introduction of water increase the hydrostatic pressure within the geology or the Tunnel area?

A It could.

Q Do you know whether or not anyone made any attempt to determine this?

A No.

Q In this report, did you contribute anything to the area on Tunnel geometry?

A No.

Q Now, I notice again on page 3, you say that, "The field reconnaissance of the hillside in the vicinity of the tunnel, did reveal evidence of very small, unrecorded entries into the coal seams." Now, you used the term "entries" in the plural and "seams" in the plural. Is it your understanding that there was more than one?

A In that area, it appeared that there might have been two small. But I --- we just considered it as one. We're only talking, you know, a couple, 2 to 3 feet into the coal seam. You can see the ---

Q But you found two entries?

A Sure.

Q Did you make an attempt to search for any more?

A Yes. In that vicinity, yes.

Q Did you look at the south portal?

A Yes.

Q And, when you say, "vicinity," were you relating to the south portal or the north portal?

A Both.

Q Did you go up to the top of the hill to determine whether or not there was any evidence of entry from the surface, to mines under the hill, itself?

A Yes.

Q Now, you mentioned the bald spots or former strip mining areas, is that correct?

A Yes.

Q Can former strip mining areas be a source of introduction of water into the hillside?

A Sure, if they're left open.

Q Pardon me?

A Sure, if they're left open.

Q Well, even if they weren't left open, because of the disturbed nature of them, aren't they a source of water infiltration?

A Yes.

Q And the only way that can be prevented is by putting in liners, is that correct?

A Sure, if you want to stop all the water, yeah.

Q So, the existence of these recovered strip mine areas, themselves, contribute or can contribute a source of additional water infiltration into this hill above the Tunnel, is that correct?

A Sure.

Q And that wasn't present when the Tunnel was constructed, to your knowledge?

A Yeah, I don't know.

Q You determined how many sources of water infiltration that were under this Tunnel area?

A No, I didn't.

Q How many do you recall, from your observations?

MR. WALL: I object to the form. I don't understand what the meaning of "sources of water infiltration." My understanding is that every square inch of land is potentially a source of water infiltration. I --- I'd ask that he --- I'd object to the form of the question.

JUDGE NEMEC: Sustained.

BY MR. SMITH:

Q Did you determine how many sources of water infiltration into the --- this particular hillside were created by some activity of man or men, in performing work or activities on the hillside?

A No.

Q Now, you mentioned weathered shale and claystone bed

immediately below the overhang, being associated with Quakertown Coal. Is that a weaker area?

MR. WALL: What --- where are you ---

MR. SMITH: Bottom of page 3.

THE WITNESS: Yeah, coals are --- are pretty soft.

BY MR. SMITH:

Q Coal is soft?

A Yes.

Q Does coal, when it's soft then, does it have much structural strength?

A Well, it can support the hillside when it's in place.

Q But as far as strata is concerned, it has, virtually speaking, no structural capacity, is that an accurate statement?

A It's just a weaker --- weaker rock unit.

Q It --- you can't --- you don't normally rely on coal for its bearing capacity, is that correct?

A Well, they leave the pillars in place when they room and pillar, so, they rely on it to some degree.

Q But for bridging, itself, they don't rely on the pillars for bridging, they rely on the stone above it, is that correct?

A It's a combination of both, yes.

Q How many layers of coal did you identify above this

Tunnel?

A There's several.

Q Can you give some idea what you mean by "several?"

A Well, if you go to page --- Figure --- Figure 4, it lists --- lists the coals that are above the Tunnel. Twelve --- twelve coal seams.

Q Twelve courses?

A Twelve coal seams.

Q Twelve coal seams. How thick would those coal seams be?

A Inches, to --- the --- the thickest one is the Upper Freeport. It's 3 to 6 feet thick.

Q Three to 6 feet?

JUDGE NEMEC: That's at the very top ---

THE WITNESS: That's at the very top of the hillside. These are all above the --- above the Tunnel.

JUDGE NEMEC: Yeah, I understand that.

BY MR. SMITH:

Q So, you have 4 coal seams above the tunnel, and they have --- then don't have much strength, as far as supporting the bridging of this Tunnel, is that correct?

A It's so far up, I think it's beyond --- beyond the Tunnel.

Q I didn't ask whether they were so far up. I asked you whether they have any strength in supporting the area

above the Tunnel, bridging.

MR. WALL: Object to the form. If it had any strength?

MR. SMITH: Strength is what the report is about.

MR. WALL: Supporting?

MR. SMITH: His testimony ---

MR. WALL: I just don't understand the question, I'm sorry.

THE WITNESS: I'm not sure I understand it, either. I mean, the coal's been there for 360 billion years.

BY MR. SMITH:

Q Would you ---

JUDGE NEMEC: He says he doesn't understand the question.

MR. SMITH: No, this gentleman (indicating) said he doesn't ---

JUDGE NEMEC: No, he (indicating) said it, too.

MR. SMITH: Okay.

JUDGE NEMEC: Go ahead. Rephrase.

BY MR. SMITH:

Q You testified that the strata --- that this report relates to the strength of some of these strata of --- as part of the geology above this Tunnel, is that correct?

A Yes.

Q Okay. Strength and what else? What was the other term that was used, or the two terms that were used?

A I'm not sure of the question.

Q But they relate to the strength, at least, is that correct?

Now, coal isn't considered to have any significant bearing capacity, is that correct, as far is bridging is concerned?

A I'm not a mining engineer, but I would say --- I'd say no.

Q And we have 4 strata. What is the thickest strata again?

A It's the Upper Freeport, which is at the highest elevations on the hillside.

Q Well, what's the thickness?

A It ranges from 3 to 6 feet.

Q And, is that above any of these intersections?

A When you say, "intersections," do you mean roadways?

Q Roadways, yeah.

A Yes, it's --- it's above --- it's roughly elevation 1340 to 1360.

Q And what intersection is that?

A That's 68.

Q 68.

Now, if there were a collapse in the Tunnel, the presence of that coal would weaken the capacity to sustain the column of dirt above the Tunnel, itself, is that correct?

MR. WALL: Object.

JUDGE NEMEC: Sustained.

BY MR. SMITH:

Q Does this coal contribute to the strength or reduce the strength of the bridging --- the geological bridging of the Tunnel?

A That's beyond my evaluation.

Q But it's weaker than the other material --- strata that you ---

A Coals are --- coals are soft, yes.

Q Did you make any evaluation of the bearing capacities or strength of the other strata?

A No. That wasn't part of my evaluation, no.

MR. SMITH: That's all.

JUDGE NEMEC: Okay. Questions? Mr. Pope?

MR. POPE: I have some.

CROSS-EXAMINATION

BY MR. POPE:

Q Did you, personally, go to the McMurray DEP Office, to make determinations concerning the existence of mining maps?

A Well, we sent them a letter and we sent one of our --- I didn't personally go.

Q Do you have any personal knowledge as to the time period in which they maintain their maps?

A I do not.

Q Are you familiar with core boring, and by that I mean, have you physically been around a core boring drill, at the time that it is being operated?

A Yes.

Q And isn't it true that, in addition to the information concerning the rock strata or the strata beneath the drill, you also obtain information concerning voids in the structure, such as whether or not you would go through a deep mine, and if so, how many deep mines, isn't that true?

A Yes.

Q And isn't it true that, when you --- a core drill is operated, it creates dust, until such time as it approaches water, and then it's gets dry, as far as the material that's brought up around the core bore?

A It's not entirely true. If you're drilling with water, you won't have dust.

Q But if you're drilling --- is it your testimony that, when you are going to drill down 300 feet, you would drill with water?

A Yes.

Q In your opinion, based upon your experiences, would that core boring also establish whether or not you were incurring or encountering water courses?

A No, not while you're inducing water into the hole. You'd have no way of determining that.

Q Your testimony suggests, although it's been said, there were four seams of coal. I understood you to say there were 12 seams of coal, is that right?

A Yes, there's at least 12.

Q And, did you make any determination as to the thickness of those seams of coal?

A Didn't physically measure them, I just identified them.

Q I'm not asking you whether you physically measured them, I'm asking you, based upon all the literature and information you reviewed, as well as your physical examination of the site, do you have any opinion as to the thickness of the 12 coal seams that exist above this Tunnel?

A Yes.

Q Okay. Will you give us the --- your opinion concerning the thickness of each of the 12 coal seams that appear above this Tunnel?

A The Upper Freeport coal is 3 to 6 feet thick. The rest of them are less than a foot thick.

Q And what do you base that on?

A Base that on literature --- literature review, on a --- on the coal seams.

Q What literature review?

A On the coal resources of Clarion County.

Q And are you talking about the Brookville Coal seam

being less than one foot in thickness?

A I think the Brookville is probably 1 or 2 feet.

Q So, that --- that would be in --- you're inconsistent there in your response, are you not?

A Sure.

Q And wouldn't you agree with me, that the general literature on the Clarion Coal seams, which are located above the Brookville seams, show an average thickness of between 17 and 32 inches?

A Sure, that's correct.

Q So, that, also would be inconsistent with the fact that they would only be 1 foot in thickness, isn't that true?

A Yes.

Q And isn't it also true that you're not a mining engineer?

A Yes, that's correct.

Q And so, what --- so, you have no professional opinion as to whether a seam of that thickness would be minable or not, isn't that true?

A No.

Q Is my statement true?

A Yes.

Q And isn't it also true that you can't --- that you would have no knowledge as to the length of headings that may have been constructed in connection with underground mining,

at the time that mining went on at this area?

A Yes.

Q Did you measure any of the strata of the various seams of rock or other formations, as they existed at each side of the portal?

A Yes.

Q And was there any variation in the measurements of the seams? And by that I mean, did they pinch out, as maybe one would be two foot thick at one end and 6 inches at the other? Did you inc --- did you see that?

A They were very erratic, yes.

Q Okay. And does that mean and is that an indication to you, that they --- they were erratic and that that difference in thickness could occur and exist over the Tunnel?

A Yes.

Q And you wouldn't be able to predict where the change in thickness occurred, isn't that true?

A Yes.

Q You're not a Hydrogeologist, is that correct?

A Correct, I'm not.

Q Do you know anything about how you determine the hydr --- hydrogeology of any particular tract of land?

A No. That's beyond my expertise.

Q Do you know if anyone in this particular case did any hydrolog --- hydrogeology, as it relates to the issues

before this Court?

A Not that I'm aware of.

MR. POPE; I have no other questions. Thank you.

JUDGE NEMEC: Okay. Any other cross-examination?

(No response.)

JUDGE NEMEC: Redirect?

MR. WALL: Yes, just a few questions, Your Honor.

REDIRECT EXAMINATION

BY MR. WALL:

Q There's been much questioning about core boring and the various --- you've indicated there was one project here, that that --- regarding the Commonwealth Slope over here, that that was undertaken. Is that --- do you recall that testimony?

A Yes.

Q Okay. And that Commonwealth Slope, is that a --- a manmade formation or --- or phenomenon, or is that ---

A Yeah. It's just a distant natural slope, yes.

Q Okay.

A Mt. Washington, I believe, is what you're referring to?

Q Yes. Okay.

The various other tunnel projects that you've been involved in and highway projects, do they --- do all --- did all those involve core boring?

A Yes.

Q Okay. And, the --- the sloping or the cuts at the --- both the north and the southern portal, do you recall testifying as to --- as to that?

A Yes.

Q And, I think you testified that each of those is approximately, 800 feet from the --- the area beneath the Tunnel, which --- where the inter --- the roads intersect, is that correct?

A Yes.

Q And, you evaluated the joint spacing at that --- at those areas, is that correct?

A Yes, 'cause that's --- that's how you do it. You have to physically see the rock, to evaluate the joint sets.

Q Okay.

You were asked a question as to whether or not you searched the area above this Tunnel for evidence of mine shafts and that type of thing. Do you recall that?

A Yes.

Q Did you find any evidence of that?

A Just those two --- two countrybank things, right above the south portal.

Q You were questioned about a portion of your report, and I wanted to go back and give you a chance to read, or to question you about the entirety of it. There was a portion of

it that was picked out, and I wanted to ask you about the entire sentence of it.

Down at the bottom of page 2, it reads as follows: "The remains of what might have been a coal chute can be seen above the south portal. However, this could also have been constructed to control surface water." The question is this: That --- those findings, did you conclusively determine that they were --- they constituted a coal chute?

A No, never got any confirmation on that.

MR. WALL: I have no further questions, thank you.

MR. SMITH: I have a couple questions on recross.

JUDGE NEMEC: Two.

MR. SMITH: Two, that's all.

RECROSS-EXAMINATION

BY MR. SMITH:

Q Counsel asked you about evaluating the joint spacing in those areas. You did --- by those areas, you did not evaluate the joint spacing inside the Tunnel, at the location of these intersections, is that correct?

A No. There's --- rock's not exposed.

Q So, you could not do that?

A Well, what you do ---

Q I understand.

JUDGE NEMEC: That's two questions.

BY MR. SMITH:

Q On the coal chute, have you seen coal chutes before?

A Yes.

Q Was this of the type of chute that's been used for coal, in your experience?

A Yes.

MR. SMITH: That's all.

MR. POPE: I have one.

JUDGE NEMEC: Where did this chute terminate?

THE WITNESS: It terminated on the south side of the south portal.

JUDGE NEMEC: Okay. If coal had been coming --- if that had been used as ---

THE WITNESS: Well, it would have--- it would have --- it would have --- it would have terminated on the railroad grade. It would have come out and daylighted and dropped, as the water was --- water was flowing.

JUDGE NEMEC: What? Right --- right down on the grade?

THE WITNESS: Yeah. That's where the water flows now. The coal would have followed that same path, if --- if that's what it was used for.

JUDGE NEMEC: Alright.

What --- do you know the date of your field trip?

THE WITNESS: February 2000. I don't remember --- recall the date.

JUDGE NEMEC: Okay.

Was there another question?

MR. POPE: Just one question.

JUDGE NEMEC: Go ahead.

RECROSS-EXAMINATION

BY MR. POPE:

Q Do you agree with me, that you're not here to express an opinion as to the existence of deep mines underneath, or excuse me, above this Tunnel, based upon your limited surface analysis?

MR. WALL: I'll object. I think it's beyond the redirect.

JUDGE NEMEC: I don't care. Overruled.

MR. WALL: Okay.

THE WITNESS: Can you rephrase the question or restate it?

BY MR. POPE:

Q What I'm --- what I'm getting to, the --- the existence of these countrybanks, dog holes, that --- that isn't conclusive as to whether or not there is other, more substantial deep mining in the area, don't you agree with that?

A Right. You can only base it on the information that --- that's available.

Q And in this c --- I'm sorry, I'm going to two. And in this case, as far as you were concerned, there was a lack

of information, as far as your review on that subject, isn't that true?

A Information was limited, yes.

Q Okay. That's all.

JUDGE NEMEC: Anything else?

(No response.)

JUDGE NEMEC: Thank you, sir. You're excused.

(Witness excused.)

JUDGE NEMEC: Let's go off the record.

(Whereupon, at 12:00 p.m., the hearing was adjourned, to be reconvened at 1:00 p.m., this same day.)

A F T E R N O N S E S S I O N

JUDGE NEMEC: Okay. Prior --- Mr. Pope asked to be excused from further participation today, and I said, "Fine."

Okay. Let's continue.

MR. WALL: Thank you Your Honor. Conrail would call Dr. Gordon Elliott.

JUDGE NEMEC: Sir, please raise your right hand.

(Witness sworn.)

JUDGE NEMEC: You may proceed.

Whereupon,

GORDON MATTHEW ELLIOTT

having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. WALL:

Q I'd ask when answering any of my questions, please try to keep your voice up, as much as possible. It's a fairly large room, and that would help out greatly with the court reporter's efforts.

Would you kindly state your full name for the record, and spell your last name, please?

A My name is Gordon Matthew Elliott, E-l-l-i-o-t-t.

Q By whom are you employed?

A I'm employed by Wexford Consulting Group.

Q In what capacity?

A I am the President and owner.

Q And, for how long have you stood as President and owner of Wexford Consulting Group?

A I've been in private practice for 6 years.

Q What types of projects or undertakings are performed by Wexford Consulting Group?

A It's predominantly tunneling. We do technical work, associated with underground work.

Q Consulting engineering work, along ---

A Consulting engineering.

Q Okay. For the benefit of His Honor and all those present, could you kindly provide for us a brief and --- summary of your formal education, in chronological order? Let's start with your secondary school or the equivalent of high school.

A Okay. Well, I received all of my education in the United Kingdom. I attended Kings College School, which I completed in 1975. I ---

Q Is that the equivalent of a high school?

A High school.

Q Okay.

A I then attended Kings College at the University of London, between 1976 and 1979, graduating with a Bachelor's of Science in Engineering Degree, with a first class honors grade.

Immediately following that, I attended Imperial College, its Arts and Technology, also of the University of London, where I studied for a Doctor of Philosophy in Engineering/ Rock Mechanics.

Q Did you receive that Ph.D.?

A Yes, I did.

Q And that would have been in Engineering/Rock Mechanics?

A That's correct.

Q Okay. How about employment history? And again, in chronological order, if we could proceed, since receipt of your Ph.D. in Engineering in 1982.

A Okay. Upon completion of my Ph.D., I was then employed by Imperial College as a Post-Doctoral Research Fellow, working on a project concerning the hydrothermo

mechanical behavior of rock.

Q And, how long did that Post-Doctoral Research Fellowship last?

A Three years.

Q So, that takes us up to '85. Does that sound ---

A That's correct.

Q How about your next place of employment?

A In 1985, I moved to Seattle and took up employment with Golder Associates.

Q And what type of business are they involved in?

A They are an international company specializing in geotechnical engineering, environmental engineering and mining.

Q And, how long did you remain with Golder Associates in Seattle?

A In Seattle, I was there for a little under three years.

Q What type of project or projects were you engaged in for Golder Associates?

A I was hired to that office to be a member of the team that was working on underground testing and characterization of the Texas site, for the candidate site for the High Level Nuclear Waste Disposal Program.

Q And what title did you have at that time, when you were in Seattle for Golder Associates?

A I hired on as a Project Engineer. I was promoted to a Senior Engineer, during the course of that employment.

Q And, your next place of employment, after working for Golder Associates in Seattle?

A After --- in 1988, I transferred within --- within the company, so, I stayed with the same company, and moved to the Atlanta Office, which was the corporate headquarters of this company.

Q Okay. And what titles did you hold while you worked for them in the Atlanta Office?

A There, I'd say I was a Senior Engineer at the time I moved. And I was promoted to an Associate of the firm, while I was there.

Q When employed by Golder Associates in Atlanta, did you specialize in any particular area?

A Yes, I --- given my background, I specialized in tunneling projects and other projects involving hard rock, rock Mechanics.

Q Okay. Just so we get a flavor for your experience in tunneling and tunnels, could you just run through for us a couple of the projects that you worked on when working for Golder Associates in Atlanta?

A Okay. Well, one of the major projects I was quite deeply involved with, was the big retaining wall out in Steubenville, in Ohio here, on US 22. And there's also a

tunnel, a drainage tunnel that's part of that, that I was the lead des --- engineer and designer on, and then was involved in monitoring construction and providing technical support during construction.

Q How about some other tunnel projects that you were involved in during your tenure with Golder Associates in Atlanta?

A Another project I had a reasonable involvement with was a Corps of Engineers Project in Harlan, Kentucky, which involved 4 tunnels through Cumberland Mountain. It was a flood alleviation scheme that diverted the river through the mountain.

Q Okay. Then you held that position with Golder Associates in Atlanta through '92, was it?

A Yes.

Q Okay. What was your next place of employment?

A In 1992, I moved up here to the Pittsburgh area, to be one of the partners of the office that we had up here, responsible for expanding its capabilities in to tunneling, tunnel work and other rock mechanics projects.

Q And again, this is with Golder Associates?

A This is still with Golder Associates.

Q And you're still specializing in tunnels and tunneling?

A That's correct.

Q Okay. Could you give us --- let's try to limit it to Pennsylvania --- some of the Pennsylvania projects you were involved in, involving tunnels for Golder Associates, while --- while employed here in Pittsburgh?

A Well, there --- there's three tunnels spring to mind immediately. Two of them were up in the Poconos region, the White Haven and Rockport Tunnels, that were having the vertical clearance improved. And then another one was a --- a tunnel, another rail tunnel, on a coal line, which had had a liner, concrete liner at its north portal deteriorated considerably, and it needed rehabilitation and make it safe again.

Q Okay. And from 1995 to the present, you've been in private practice, correct?

A That's correct.

Q Specializing in any particular area?

A In tunnels and tunnel projects.

Q Okay. So, continuing to do the same type of thing ---

A Same kind of work.

Q Okay.

Were you engaged by Conrail to study and report on the stability of the East Brady Tunnel, which is the subject of these proceedings?

A Yes, I was.

Q Are you authorized to testify on behalf of Conrail at today's ---

A Yes, I am.

Q And, before you is what we previously marked as Conrail Exhibit Number 1. For the record, what is that document (indicating)?

A This (indicating) is the report that I coauthored with John Lasko, providing a summary description of the activities that we carried out and the calculations and the results that were undertaken to evaluate the structural integrity of the Tunnel.

Q I ---

MR. WALL: Your Honor, I would offer the witness for cross-examination as to qualifications.

JUDGE NEMEC: Any questions?

MR. SHARP: No, Your Honor.

MR. PRICE: No, Your Honor.

MS. SMITH: No, Your Honor.

MR. SALAPA: No, Your Honor.

VOIR DIRE

BY MR. SMITH:

Q Do you have any geological background?

A No.

Q Are you familiar with the area of what they call geotechnics?

A Yes, I am.

Q Earth mechanics?

A Yes.

Q How would you relate to those areas?

A I've done courses in --- in geotechnical engineering, and I still do projects involved in retaining structures for soils and evaluating slope failures, that sort of thing.

Q But you're not considered to be a geotechnical expert, is that correct?

A Yes, I would be considered a geotechnic --

Q You do?

A Rock is just one of earth's materials.

Q Are there any societies that the geotechnical experts belong to?

A Most of them are members of the American Society of Civil Engineers Geotechnical Institute.

Q Are you a member of that Institute?

A Yes, I am.

Q Okay.

MR. SMITH: That's all.

JUDGE NEMEC: And, for whatever it's worth, you're a Registered Professional Engineer within the Commonwealth of Pennsylvania?

THE WITNESS: Yes, I am.

JUDGE NEMEC: Okay.

You may proceed, Mr. Wall.

MR. WALL: Thank you, Your Honor.

DIRECT EXAMINATION (CONTINUED)

BY MR. WALL:

Q Dr. Elliott, I'm going to ask you a series of questions relating to the East Brady Tunnel. If, in responding to any of my questions, you --- your response involves an opinion, I would request that you limit those responses to those that you're able to proffer within a reasonable degree of professional certainty in your profession. Agreed upon?

A That's agreed.

Q Okay. Could you kindly and briefly describe the --- the Tunnel in question in these proceedings?

A Okay. Well, the Tunnel is located about 1 1/2 miles east of the town of East Brady, which is approximately, northeast of Butler, Pennsylvania. It's been mined through a hillside that forms a large bend in the Allegheny River, the East Brady Bend. It's a little over 2400 feet, measured from one end to the other. It's a --- the distance below the ground surface varies. It's approximately, just under 30 feet wide between the sidewalls and it's about a little over 23 feet from the center of the crown down to the --- to the floor.

Q Do you have any information as to the approximate date of construction?

A Based on the date on the keystone at either portal, it was completed in 1915.

Q I'd like to direct your attention to Figure Number 1, of Conrail Exhibit 1. What is that?

A This (indicating) is simply a map identifying the location of the Tunnel. The large figure is a surface map of the State of Pennsylvania, highlighting certain of the cities throughout the state. And there's a zoom-in with --- from an aerial photograph of the East Brady area, and on the aerial photograph, I've highlighted the approximate area of the housing for the East Brady and I've also indicated the location of the Tunnel.

Q Okay. Could we move on to Figure 2, on the following page? What is that?

A Well, the top picture is a --- an extract from a USGS topographic map. The site shows the Allegheny R --- the blue areas are the Allegheny River, the bottom and top, and there's a --- the brown lines are the contours, lines of constant elevation. And there's a double dash line through the middle, passes through the R of Riverview, which denotes the approximate location of the Tunnel.

Q Okay. And State Routes 68 and 23 are noted thereon?

A They're shown there as well, that's correct.

Q And the photograph beneath that, is that a ---

A Simply an aerial photograph of the same portion, the same area, covered by the map. It's been scaled to the same scale and again, I've highlighted with a yellow broken line, the location of the Tunnel.

Q Could you give us a brief description of the scope of the stability study performed by you, with regards to the East Brady tunnel, just an overview?

A Well, the scope of work involved three primary things. One was to carry out an intrusive investigation of the Tunnel lining, which was carried out by drilling a series of probe holes through the Tunnel lining, beneath each of the roads that pass over the top of it.

Q Okay.

A Then we also commissioned a geologic study, that you've heard John Lasko testify to.

Q Uh-huh.

Let me back up just, why --- why were the bore holes or the probe holes --- what was the purpose behind that?

A Well, the probe holes allow us to make a visual inspection of the materials that make up the lining and exist behind the lining. Through the visual inspection, we're able to make certain measurements, such as the thickness of lining and thickness of maybe different rock units that we find there. We can detect, you know, small voids or joints that

cross or bedding planes, you know, sort of geologic features. And, by monitoring the way in which the holes were drilled, we can get some idea as to hardness, softness, differences in that respect, as far as the materials are concerned.

Q That visual inspection, is that done with the naked eye, or is other equipment involved?

A No, we have an --- a tool that we use. It's a fibre-optic tool that we put up inside the hole, and we're able to see through a little TV screen, you know, what --- what's being viewed.

Q Okay. The --- there's been testimony here about the geological study that Mr. Lasko was commissioned to do. Did he perform that at your request?

A Yes.

Q And why did you have that done?

A Well, it's --- that's important to be able to establish what rock units this Tunnel is situated in, and to get some information as to the characteristics of the ground, that you might be able to use to infer the --- the type of ground it's going through, the sort of difficulty they might have had, the sort of problems they might have encountered as far as ground support. And it also helps identify, when you need to go to the literature to find data on things like strength and other mechanic engineering properties, what units it is you're looking for data for.

Q Okay. Let's take a look at that data, and --- and let's see what you had done next with it. So, you --- you've done the visual inspection, you've done the --- the --- the bore hole probing, the probe holes and also the --- the geological study. What was done next, in the scope of your --- or within the conduct of your stability study, generally?

A The next --- immediately what you do is assimilate all of that information into a conceptual model or mathematical model, if you like, of the environment in which the Tunnel is located. And then, with that mathematical model, we're able to carry out calculations of things such as the stresses within the ground, stresses within the lining, displacements that might have occurred within these materials, and thereby characterize the structural integrity of the --- of the Tunnel.

Q Those --- those various materials that you're evaluating and those values that you put in, do they --- what type of properties are --- do you --- of those materials do you consider? Do you consider weight?

A Yes.

Q What other types of properties are ---

A Normally there are 3 sorts of things that you're looking at. One is yes, the unit weight of the material that it exerts in a gravitational field. The other property --- another property is the strength criteria, under what

combinations of loads imposed on a material would it start yielding and maybe a --- a --- start behaving nonelastically. And then, the other parameters are things that can relate load to displacement, which in this case, we were using elastic properties.

Q We'll get into that in further detail. Could you --- before we do so, could you --- you had testified --- you touched upon the Tunnel, itself. What can you tell us about the geometry of the --- the Tunnel? Of course, I'm referring to the East Brady Tunnel.

A Okay. Well, like I said, it's a little under 2 1/2 thousand feet. It's previously been reported to this Court as 2,464. I personally measured it at 2480. But, it's approximately the same number. It's layed out on a curve; it's not a dead-straight tunnel. You can't stand at one portal and see the other portal at the other end. It's layed out on a curve that has a radius of about 1650 feet. The invert is at approximately, 847 feet above mean sea level.

Q What does that mean, the invert? What are you ---

A That's the floor.

Q Okay.

A The floor, the elevation.

Q Okay. So, the south portal is 847 feet about sea level?

A Right.

Q Okay. I'm sorry. I didn't mean to interrupt. Continue.

A And as I mentioned, it's a --- it's approximately, just under 30 feet wide, between the walls and it's about 23 feet from the crown to the floor. It has the shape, what we call an inverted U, meaning that the roof is cylindrical in shape and the --- the lower half is --- is --- has a square shape.

Q Uh-huh.

A It's a common shape used in early tunnel construction.

Q Okay. Where --- could you provide us with information regarding the proximity of the Tunnel to the two State Route above it?

A Okay. Well, the State Route 20 --- both State Route cross the Tunnel at what I'll call a third point. The State Route 2023 is about a third of Tunnel length from the south portal. It's about 815 feet or so from the south portal. And the elevation of the State Route at that point is about 360 feet above the floor of the Tunnel.

Q Okay.

A And the State Route 68 is approximately, a third of the tunnel length in from the north portal, so, it's about 820 feet from the north portal. And so, the two --- two points are about 800 feet apart, you know, within the Tunnel.

And the --- the overburden of State Route 66 --- State Route 68 is about 500 feet from the road elevation down to the floor of the Tunnel.

Q Okay. Alright.

Could I direct your attention to Figure 3 of Conrail Exhibit Number 1? And I'd ask that you kindly indicate what the numbers are on the left margin and what --- what this exhibit relates to?

A What we're plotting here is some survey information of the dimensions of the Tunnel. You see a grid, which up --- up and down the page is numbers depicting the elevation above mean sea level. And across the bottom is just a scale of horizontal distance. So, each of the little squares that you see within the graph there, is approximately, 2 feet by 2 feet.

Q Uh-huh.

A The --- you see on each of the --- plotted on the same picture, the geometry of the north and south portal. The diamonds indicate the actual points that were surveyed. We had measured height and elevation and offset for, and the red dash line is a --- is simply an interpretation of the continuity of that geometry between the yellow mark.

Q Uh-huh.

A To try and assist in understanding what you're looking at, I've underlain photographs of the north and south

portal, underneath the picture.

Q What information did you derive from the geological study that you commissioned Mr. Lasko to perform?

A The geologic study provided me the information I needed to know about the geologic setting, the material through which the Tunnel was driven and structure and nature of the materials, types of materials.

Q And specifically, what were you able to derive from that?

A Well, specifically, you know, we --- we --- we learned that the majority of the Tunnel is --- has been excavated in --- in a fairly good quality sandstone and that the geology's in a --- in a slightly basin shape, so it means that the materials that are beneath the floor at the south portal, when you get up to the north portal, actually start rising up, and the north portal, itself, is actually in the geologic unit lower in the stratigraphy.

Q Okay. Very good.

Your experience in --- based upon your experience in tunneling, did you find that this --- the geological factors here were conducive or favorable for tunneling?

A Yes, I would.

Q How would you compare those to other areas throughout Western Pennsylvania?

A Compared to other tunnels I've looked at in --- in

Western Pennsylvania, these are some of the most favorable conditions, I think, you could find to drive a tunnel of this sort, of this type.

Q I'd like to move on to the --- the probe hole drilling portion of your --- your activities. And you --- you started to touch upon this, but I'd like to delve into that a little further. What was the purpose of the probe hole drilling?

A Well, the --- the purpose of the probe holes, was to provide us a means for making inspections of the materials through --- of the liner and the materials immediately outside of the liner. It tells us something about whether there any voids exist behind the lining, or whether the lining was placed immediately up against the --- the opening.

Q Uh-huh.

A We can find out something about the degree of weathering, if it is under --- it's undergone since the time it was constructed. It tells us something about the nature of the materials: Do they appear to be very disturbed, or are they essentially undisturbed, quite intact?

Q Okay. Where did you perform the probe hole drilling? Where --- probe ---

A We --- we carried out a series of holes beneath each of the highways. We drilled eight holes beneath each of the highways. Each hole was about 4 feet apart from the next one,

in a --- in a slice across the Tunnel. And the holes were drilled in directions rather like a fan, a fan arrangement around the Tunnel, so that we got numerous observations of the nat --- the materials behind the lining.

Q Okay. Describe for us that --- the --- the size of the hole, of each one of these holes.

A Okay.

Q Of both the diameter and the length.

A Well, the hole is about an inch and 5/8.

Q Could you show us?

A It's about the size of (indicating) --- that sort of size hole. And it's drilled to about a 10-foot length, is what we were using. Ten foot is a number that we selected because it's --- it's easily manageable with the hand operated drills that we were using. And typically, we find the liners to be about two feet thick, so this would allow us to see at least 6 feet beyond the limits of the --- the original excavation.

Q When you say, "typically the liners are 2 feet thick," where do you derive that from?

A My experience of looking at a number of different tunnels, typically you get 6, 8 courses of bricks or something, or when it's poured, it ends up being --- it's about 2 feet thick.

Q What did you find, as far as the thickness of the

liner in this Tunnel?

A Well, if --- can I draw your attention to another exhibit here?

Q Yeah. Which one would that be?

A The results of our probe hole drilling are illustrated on Figure 6.

Q Okay.

A Here (indicating), I have drawn again, two cross sections, so that's effectively a slice cut across the Tunnel.

Q That is --- that is where you did your probe holes, correct?

A Yes. The left hand --- the one on the left-hand side is the section below State Route 68 and the one on the right-hand side is the section below State Route 2023.

Q And each square represents a --- an area of 2 square feet?

A The same scale, that's correct.

Q Okay. And what did you find with regards to the --- the thickness of the liner in this Tunnel?

A Okay. Well, as I say, it varied. At Station 2023, it was typically about two, two and a half feet in the crown and tend to thicken as it approached the sidewalls.

Q To what?

A Well, we drilled one hole in the sidewall at that --- at that particular section, and we drilled it 6 feet and

still hadn't quite got through the outside of the liner. So, we know it was at least 6 feet thick at the place we drilled it.

Q And most of the liners that you encounter are two feet?

A Typically.

Q Okay.

A Typically.

Beneath State Route 68, the concrete was considerably thicker. It was --- I think it was in excess of about 6 feet, and often, some of the holes we drilled went 9 1/2 feet and we were still in concrete. So, clearly, it is very thick, stout liner at that location.

Q Okay. And, I think --- what did you drill, 8 holes on each ---

A Eight holes at each section, that's correct.

Q Okay.

A I say the location of where we --- what we call the "collar." It's the point at which we start drilling the hole. You can see them fairly regularly spaced around the opening. And you can see the direction that we drilled each of the holes in. And then, what I've drawn on there, is --- is little bars across, where we went from the transition from the concrete, to the ground around the outside. And then I've also tried to illustrate that the materials --- the nature of

the materials we found, as some --- whether the hole was smooth, regularly shaped, indicative of a hard, unweathered material, or whether it tended to be a little bit oversized, indicative maybe it's a little bit softer rock, which would have been oversized by the --- by the drilling process. And I've also indicated some of the areas where we found some possible bedding partings or --- and areas of debris, loose --- loose material that was on the back of the lining.

Q Well, let's --- let's talk about those, one at a time. Is there any type of brick component to this liner?

A There is a veneer of brick around the arch.

Q Okay.

A I know previous testimony has speculated it's maybe a brick arch, but we only found one course of bricks around the inside, like a veneer of brick around the inside. The majority of the materials is concrete and predominantly river gravel. We took one core sample, with which to put in a laboratory and --- and get a strength of it. And I think I presented the results of that on Figure 7.

Q Figure 7?

A For the core that we tested there, the strength was about 7 1/2 thousand pounds per square inch. That's a strength which is typically, 50 to 100% stronger than most concrete structures we build today. Typically, people building concrete structures will specify maybe 4 or 5

thousand PSI strength, for 28 days. So, this is strong concrete.

Q And you indicated the type of gravel that was used in this concrete. Could ---

A It --- it was river. It was rounded aggregate.

Q Okay.

A Tends to be ideal. Aggregate, I believe.

Q Okay. Alright.

And, you had made mention of debris behind the liner.

A Uh-huh.

Q Did you find much of that?

A Very little.

Q And --- and tell me what that is. What --- what is it? Why would one find debris? What is debris? Why would you find it?

A Okay. At this particular Tunnel, we found a lot of situations where the --- the hole went from concrete, straight into rock, which would lead us to believe that the liner was built by putting a form up and pumping concrete in behind it, to fill the void, as best they could, behind the lining. There was no back form or anything to limit how far that concrete flowed.

Q Is that a preferred method of construction?

A It's one method.

Q Okay.

A I wouldn't say it's preferred. It's one method.

Q Okay.

A But that wouldn't necessarily have filled all of the voids. There may have been small pockets of air left, because of the slump of the concrete. And over the 85 years it's been existent, it's likely that small, you know, almost like pebble-size pieces, you know, would have weathered away and slowly slaked off --- off the --- the ground, the rock around it and started slowly filling that void. And that's the nature of the debris that you see.

Q Okay. And you didn't find much of that, though?

A No. As I say, as soon as the void gets filled with debris, it chokes itself up.

Q Okay. Does that --- once that occurs --- and that occurred in this case? That's what you found?

A We didn't --- we didn't see many unfilled voids.

Q Okay. And does --- does the filling of that void with debris, how does that affect the structural integrity of the --- the Tunnel?

A Well, it means that more of the ground is star --- is supporting itself and not totally reliant on the liner being there.

Q So, that actually lends itself to the structural integrity of the Tunnel, is that correct?

A Yes.

Q There was testimony today or questioning rather, about ground water. Did you encounter much in the way of ground water when doing these probe holes?

A We didn't encounter much. We encountered free ground water in three of the holes we drilled; three out of 16 holes.

Q Okay.

A Generally, the holes were --- were dry. They were maybe slightly damp, in --- in some of them, so, we were drilling with air. We were getting a lot of dust coming out. So, occasionally, we had to suppress that with water, you know, that we --- we introduced, because there wasn't much, you know, water in the holes that we drilled.

At Station, I think beneath 2023, the lower holes on either side, we did encounter water. Immediately, we broke through the concrete, but within a period of five minutes, that dissipated to barely a dribble.

Q Was this --- the detection of water, did you find that to be unusual?

A Insofar as it was a pocket like that, it's not a common occurrence, but it's not unusual to encounter water when you drill through a lining.

Q What was the significance of that water flow ceasing ---

A It means ---

Q --- (Continuing) --- within a couple minutes?

A It means that there's very little volume buildup behind the lining. It means it drain --- drains pretty quickly.

Q And, does that have any impact or --- on your findings, with regards to the structural integrity?

A No. My belief was that the way it dissipated so quickly, is that the hydrostatic pressures are fairly low and very isolated in --- in spot points around the lining.

Q Uh-huh.

A Which is --- that's not unusual. I mean, the tunnels that have been existent for that long, the floor isn't lined, so, it's been a drain in the hillside for 85 years.

Q Okay. Did you conduct a visual inspection of the --- the Tunnel liner? We've talked about the probe holes. How about the visual inspection and your overall evaluation of that?

A Yes, I did make a visual inspection of the arch, throughout the entire length of the Tunnel.

Q Uh-huh

A And --- and generally found that is was in very good condition. Very little brick had seemed to have fallen out. It was still bound out well within the Tunnel. The only exceptions is right at the very north portal, where I believe we're all aware that there's a --- there's a hole in the po --

- portal structure, and immediately behind the headwall, which is --- is not related to any sort of stress or overstressing for heavy loads put on it. It has more to do with a deterioration of the concrete, as a result of ice and water collecting at that particular location. But ---

Q Let me just back up on that one. Just take them one at a time. In your report, I think you indicated the overall condition of the lining is considered good to excellent. What do you mean by that?

A Well, it seems to me, it shows very little signs of deterioration over 85 years.

Q Okay. And as far as the northern portal, you don't have that at the southern portal. The direction or the location of that north vs. south, does that have --- the location of that portal, does that have any effect upon the deterioration that you found?

A Yes. I mean, it's quite common to find problems at the north portal.

Q Why?

A It's because it doesn't get the warming trends of the sun during the day. It's in the shadows a lot longer, and so, ice accumulates a lot more at those locations. It doesn't melt on a daily basis. It stays solid ice for a lot longer.

Q Okay. You indicated that the deterioration that you found at the northern portal is not attributed to overstress.

Please explain that.

A Well, most people think that if a tunnel liner collapses, it's because somebody's imposed a very high load on the structure and it's just given way. It's not able to support the load, it's given way. This is a situation where the material, itself, has been slowly deteriorated. It's been broken apart by the constant freezing and thawing. And so, the integrity of the material, itself, has been --- has deteriorated, to the point where it starts falling in, you know, almost under its own weight.

Q How about the --- the abatement or repair of this condition about the northern portal? Is that a significant undertaking?

A Not particularly. It's reasonably straightforward. We understand the processes that are involved. And so, we can design measures accordingly.

Q Okay. We've gone through your investigative efforts and those types of things. As --- let's move on to the actual stability analysis, itself. What type or types of stability analyses did you perform? Was there more than one?

A Yes. We carried out two types of analyses.

Q And, could you give us a brief explanation of each?

A Okay. Well, the --- basically, the --- the --- the model we developed, we took one case, where we assumed that the concrete arch was an integral component of the ground

around it.

Q Okay.

A In other words, it's a layered rock mass with the concrete built in. And we can take --- give consideration to the load bearing capability of the rock, as well as the concrete, itself. We don't --- and then the other one, generally the conditions for that are the --- the absolute ideal conditions for that, is that you put the lining in pretty shortly after, when the tunnel's built.

Q Okay.

A And if it's left to stand for --- for a long time, then maybe the arch is more freestanding. So, for that reason, we looked at the arch as a freestanding structure, totally unconnected with the rock around it, and applied to some sort of imposed loading, which would be maybe generated by some sort of weathering or deterioration of the ground above it, loosening up and falling.

Q And when you --- I think you testified earlier, when you did your probe holes, you found that the concrete liner was close in proximity to the materials behind it, is that correct?

A That's correct.

Q And there were only very limited areas where you find any type of debris or gap at all, is that correct?

A That's correct.

Q Okay. So, of these two models, I think you said, the integral model ---

A The one I'd call the integral model and one the freestanding.

Q Which do you feel is more representative of the facts present at the ---

A I think probably the integral model is somewhat closer to the real condition.

Q Okay. Very good.

Now, you take --- excuse me one second. Let's take a look at the integral model first. This is a --- this involves a series of calculations, is that what you had said?

A Correct. Correct. It involves many hundreds of calculations. It's more than you do on a pocket calculator, and so, you need a computer, you know and a computer program, to carry out these calculations for you, for the --- to expedite time.

Q Do you have various exhibits that relate to these calculations in these efforts?

A I've provided graphical illustrations of the results ---

Q Okay.

A --- (Continuing) --- that we obtained.

Q Why don't --- where do they --- why don't we take those one at a time?

A Okay. Well, the exhibits start on Figure 8, and they come in pairs.

Q Let's --- let's --- first of all, let's talk about --- my questions will relate to the integral model. Okay, first. And then we'll go to the freestanding model later on.

A Okay.

Q So, Figure 8 appears to be a --- a --- a color coded-type of thing. Can you tell us what that represents?

A Well, certainly. This is a picture of a slice through the ground. And what this is mentioned under the cal --- the things that we can calculate, is the load experienced at any given point, within that slice of ground that we've --- we've cut through. So, these pictures repre --- the results of many hundred of --- of these points that we calculated the load, at that point. And, if you can imagine that all these points maybe experience different loads.

I guess I could best explain that to you, that if we filled this room with people, and somebody open the door and tried to push one more person in it ---

Q Uh-huh.

A --- (Continuing) --- you know, the people back at this end of the room (indicating) wouldn't necessarily feel the force of that person being pushed in, they'd feel some sort of lesser cushioned force. And that's just the way things are distributed.

But we could draw a line around all of the points, that say, have a --- have a ratio of the strength to the load, in other words, a point where its strength is twice as much as it needs to be ---

Q Uh-huh.

A --- (Continuing) --- to support the load. Let's assume we drew a line around all the points that had a --- a strength factor of between 1 and 2, and we colored it yellow.

Q Okay.

A Alright. That is the region that you're seeing within here (indicating). Then say we picked one between ---

Q Let me --- let me just --- let me just --- can I back up, just a little bit?

A Certainly.

Q We'll get --- the --- you've indicated the yellow is 1 to 2 times the strength that it needs to be ---

A Yes.

Q --- (Continuing) --- to support ---

A Yes.

Q --- (Continuing) --- the load, and to prevent a failure, is that correct?

A Yes.

Q. Now is --- in this Figure number 8, where is the liner?

A In this particular Figure, I started off not

modeling the liner, at all.

Q So, you're basically doing these calculations based upon the opening, without the liner?

A Opening without any lining, that's correct.

Q Okay. And there's --- there's different scenarios here. There's four different scenarios. Can you explain what the ----

A Well, if --- if I can also explain one other thing, you'll see that the colors aren't continuous; that there are, like horizontal bands across the picture?

Q Well, what do those bands represent?

A Those represent the different layers or different kinds of rock material that we've assumed in the rock.

Q From your geological survey?

A Which is the information we got from combining our geologic survey and our probe hole drilling, and putting an interpretation of all that information together.

Q Okay. It's ---

A So, you've got to imagine we have like a layered --- like a layer cake?

Q Uh-huh.

A Through which we've excavated the hole. And each of the bands represents a different type of material.

Q And those --- those bands of materials were confirmed by the geological survey and your bore drilling,

correct?

A Yes.

Q Okay. I apologize. Please continue.

A That's okay.

Q What is the ---

A We --- we did the --- and I say the reason that we did this without the lining is because, just to get an initial feel for how much --- how far away from the opening is the ground affected by the presence of the opening, and can we make any interpretations as to whether the --- to what extent the liner is needed.

Q Okay. So, that's basically what Figure 8 is?

A That's why we carried out this analysis.

Now, there's 4 analyses, because there --- the strength of materials are typically not unique. They vary from point to point. So, we typically undertake these studies, by assuming a range of strength, a range of properties, and we'll look at --- and calculation, using the worst case and we'll look at a calculation using the best case.

Q On these 4 boxes, which is the best case scenario and the worst case scenario?

A The optimistic scenario is in the top, left-hand box.

Q And what is the worst case scenario?

A And the worst case scenario would be in the bottom

right.

Q Okay. And, the --- in the bot --- let's take a look at the worst case scenario. There are some areas around the opening, that fall below the 1.0?

A That's correct.

Q What does that tell you?

A That tells us that they --- the load that the material in that zone of our --- of our model, exceeds its strength.

Q And it basically tells you what, by way of the liner?

A That there is a need to have a liner there, to provide support of that material.

Q Okay. Alright.

MR. SMITH: Can you repeat that, please?

THE WITNESS: There is a need for a liner to support that zone of material.

BY MR. WALL:

Q Okay. Could we go through to the similar study, with considering the liner in place? Would that be Figure 10?

A This would be Figure 10.

Q Okay. Now, the --- do --- do these series of findings also incorporate a worse case scenario vs. a best case scenario, based upon the ---

A Yes, they do.

Q Okay. When you say, "low to high," what do --- what do you mean by that?

A What I mean is that I --- I mention that these materials generally have a range of strength, that vary from one location to another. The low is a number selected from the low end of that range.

Q Uh-huh.

A And the high number is a number selected from the high end of that range of strength.

Q Uh-huh.

A So, in other words, if we assume a high, it means we're assuming a high strength for the material, which is --- therefore makes it the optimistic scenario. Whereas, if we picked it from the low end of the range, it would be the less pessimistic, less optimistic, sorry, scenario.

Q Okay.

MR. WALL: With Your Honor's permission, I'm going to present the witness Tables 1 and 2, that have been circulated to all the parties. There's another one for you.

It's --- it's my understanding, Your Honor --- well, my intent would be to just refer these as Table 1 and 2 of Conrail Exhibit Number 1. Does that suit you?

JUDGE NEMEC: I understand.

MR. WALL: Okay. Very good.

BY MR. WALL:

Q Let's take a look at Table Number 1. There's various materials listed on the left margin. Why are those materials --- why do they appear there?

A Those came out of our geologic studies, being materials present at the site.

Q And the concrete would be what the liner was comprised of, correct?

A That's correct.

Q Okay. And that was confirmed, also, by the bore testing, is that correct?

A Right.

Q Okay. And, you have a unit weight assigned to each one of these ---

A That's correct.

Q --- (Continuing) --- elements or --- or materials?

A That's correct.

Q And that these --- where did you get that --- that information, that data?

A The data, there's a --- a --- very large data base of published material. Rocks have a fairly consistent strength within the range that we're looking at.

Q Uh-huh. Okay.

And, the next column over there, says, "Rock Mass State. Disturbed vs Undisturbed." For each one of those materials, in the --- in the area of the Tunnel, why two --- what does

"Undisturbed vs. Disturbed" mean?

A Well, I --- I wanted to include in my analysis, the --- an opportunity to evaluate the impact of some sort of weathering or disturbance of the ground immediately above the arch. In other words, if there was any separation, if it weathered, and therefore, the strength had deteriorated, I wanted to be able to represent the zone of disturbed material within my calculations.

Q And that is a worse case scenario-type of thing?

A Yes.

Q And did you find much of the way --- much in the way of disturbed materials when you did your probe hole?

A There wasn't a lot.

Q Okay. Alright.

Then it says, "Hi/-Lo Range." What --- what is the significance of that?

A Well, again, for each of these materials in the disturbed and undisturbed state, there's a range of strength that you might expect, based on the data base of --- of testing different sample of same --- similar rock types.

Q Okay.

A Different locations. So high's at the high end, and low's at the low end.

Q The next grouping, I guess there's about 6 columns there. What do they represent?

A Those are all parameters that are used to evaluate the strength properties under different loads. It's important to recognize that strength isn't a unidimensional, or we're not dealing with a unidimensional problem, where, you know, you apply one load to a sample, it crushes, that's its strength. We've got a three dimensional problem. And there are stresses in different directions, and that affects its strength. You have a mathematical formula used to describe that combination of stresses, and these parameters are used to divi --- derive that.

Q And the --- the last or the second to the last column and the last column, what do they represent?

A These are the elastic properties, that allow us to relate displacement to the stresses that are imposed. So, the Young's Modulus is --- is the --- relates the displacement in the same direction as the loading.

Q Uh-huh.

A And the Poisson Ratio is what we use to relate displacements in --- in 90 degree direction. So, if you imagine, if I had a cylinder of something that I was --- that I was pulling apart, like a rubber block, and you'd see it stretch in this direction (indicating), you'd also tend to see it thin in this direction (indicating).

Q Okay.

A A ratio of the thinning to the stretching is what we

use to describe by the Poisson Ratio.

Q These published ranges of the qualities of these various materials, are they generally accepted in your field of expertise?

A Yes.

Q Table Number 2 is --- would that reflect that you conducted these various studies under all different types of scenarios, or best case scenario vs. worst case scenario?

A That's correct. It's just a graphical representation of all the different scenarios we looked at.

Q Okay. So, you take your --- just so --- just so I'm clear, is you take your --- the data that you derive for the --- through the geological survey and the actual probe drilling, to know what type of materials the Tunnel's passing through, correct?

A Yes.

Q And then, you take the recognized properties of those materials, and then you basically calculate --- make your calculations as to whether or not the --- there's sufficient support there?

A That's correct.

Q Is that basically what it is?

A That's correct. We put --- we have a mathematical formula to describe the behavior of the materials, and we have input, as you say, that allows us to calculate specific

numbers. And we calculate load, at a point. We can compare that with strength, as you explained. And we can calculate the amount of movement at that point.

Q Could you explain Figure Number 10? Why don't you start off by showing us which of these ---

JUDGE NEMEC: Number 10 or Number 2?

MR. WALL: I apologize, Your Honor.

JUDGE NEMEC: Oh, Figure 10. Figure 10. Go ahead.

MR. WALL: I'm sorry. Figure 10.

JUDGE NEMEC: I misunderstood. You were correct. Go ahead.

BY MR. WALL:

Q These are the results of these mathematical calculations?

A That's correct.

Q Is that basically correct?

A Correct.

Q Which is the --- under the --- I guess worse case vs. best case scenario, depends upon the --- the range of --- that you're using, high vs. low range?

A That's correct.

Q Okay. Can you show us what is the worst case scenario here, regarding the integrity of this Tunnel?

A The worse case scenario would be in the bottom, right-hand corner.

Q Okay. And what is the best case scenario?

A The best case is in the top left.

Q Alright. Let's focus on those. Why don't you tell us what --- why don't you interpret the --- the findings on the worse case scenario here for this integral arch model strength test that you performed?

A Okay. Well, what this one shows us is that we sort of have to compare it with the information we had on Figure 8. But the zone of yellow around and the --- and the ground around the opening, is considerably less, which shows that the arch is providing --- is enabling the rock to distribute the loads in the ground and support itself, a lot better than if the arch was not present. We still have a zone of --- of gray in the floor, that you can see, where apparently the strength of material's exceeded. This isn't unusual to see these sort of things. Obviously, visually, you don't see that occurring, because gravity's still working downwards beneath your feet. It's not like it falls up in --- considerably into the air. And it also is a testimony to the fact that the square bottom is --- is not as conducive to distributing the load as the arches. That's why we build tunnels with an arched roof, as opposed to a square one.

Q Okay.

A The --- as I say, we're assuming, for the concrete, itself, we can see that even under the assumption of a low

concrete strength, which is the sort of strength that maybe we'd specify if we built the arch today, the --- the ratio --- the material --- the concrete is still at least twice as strong as it needs to be, over the majority of the arch.

Q And this is --- in the other portions, twice --- twice as strong --- at least twice strong?

A At least twice. Down in the sidewalls, you've got zones there where it's at least 5 times as strong as it needs to be, to support the load that it's carrying.

Q And this is the worse case scenario?

A And this is the worse case scenario.

Q Let's discuss the --- the ---

A If I --- can I just say this?

Q Please.

A Another interesting thing is that we see that we have the --- the layer of --- of ground immediately above the arch, where we see a large patch of yellow there. That's a --- was modeled as a --- as a --- one of the softer, weaker claystone units.

Q Uh-huh.

A But immediately above that, we have a sandstone unit. And you can see that in the sandstone unit, the strength of the sandstone is at least 5 times as much as it needs to be. Which means the zone, you know, once you get beyond, up into those sandstone units, the ground isn't really

experiencing much loading at all, and so, you're starting to get into zones where the ground is apparently ignorant that the Tunnel's even there.

Q Okay. Alright.

Anything further on the worse case scenario, depicted in the lower, right-hand corner of Figure Number 10?

A No, I think that's about ---

Q Okay. How about the --- the scenario in the upper, left-hand corner?

A Well, as I say, under the optimistic conditions, really, we have the strength of none of the materials is being exceeded, and the strength of the arch, in its entirety, is at least 5 times what it needs to be, to support the loads that might be coming on it.

Q And again, this liner, generally, compared with liners of today, is twice as strong as liners of today, is that correct?

A 50 to 100% as strong, yes.

Q Okay. Let's move on to the freestanding arch model, if we could. I believe that's ---

A That would be Figure 14.

Q Figure 14.

And again, if you could refresh our recollection, the freestanding arch model that you did is --- how --- how does ---

A The mathematical model essentially assumes that the arch is --- is independent of the ground around it.

Q Okay. So, basically, it --- is that the same as assuming that the ground around it provides no support?

A It --- basically, it means that if we were to put an arch on the table, you know, it's supported underneath. And we provide a little bit of constraint as to how to --- at the bottom of either side, to see how much it would spread out. Basically, that's what we're looking at, an arch on the table, that we're about to put a load down on.

Q Okay. So, you're basically testing the strength of this concrete, sitting alone?

A That's correct.

Q Okay. Can you explain Figure 14? Are there --- it looks like there's a couple different scenarios above there.

A Okay. Well, as I mentioned, for this freestanding arch, we have to define an imposed load.

Q Okay.

A Okay. It's --- self weight doesn't cont --- of the surrounding materials doesn't contribute amount. We have to define a --- a debris pile, that might be sitting on top of the arch.

Q Okay.

A Okay? And so, in the top row there, I just sort of tried to illustrate where that debris pile, the height of it

and the approximate lateral extent of the debris pile. Each column of --- of each load case is four different scenarios.

Q Three different assumptions?

A Three different assumptions. So, on the --- the --- the most severe, is on the Load Case 1, on the left-hand side, where we assume a pile of loose material that's 14 feet high, sitting on top of the --- of the arch.

Q When you did your probe hole drilling, did you find anything that approached that?

A Well, our probe holes were limited to 10 feet, so, we didn't even go beyond that. Within 10 feet, we didn't find anyth --- any zone going anywhere near that high up.

Q Okay. Very good.

A So, it's a very conservative assumption that we made.

Q Okay.

Could you explain ---

A And then, the grass immediately below, running across the middle, essentially tell us the same thing as we were --- been describing previously, although we have divided the zone up into a lot more colors over the range. But ---

Q What do those colors mean, the 3.1, the 10.0, the 17.0, the 24.?

A Again, it's the ratio of the strength of the material, or the shear strength of the concrete, to the load

that it's experiencing. So, again, we can imagine that within this concrete cross-section, there may be, you know, 10's, if not 100's of little points that we're calculating the load for.

Q Uh-huh.

A And they're all different.

Q The 3.1 means --- is it ---

A It means it's 3 --- at least 3 times as strong as it needs to be, to support the load that it's experiencing.

Q And that --- that's the strength factor of four boxes across this paper, right?

A That's correct.

Q Okay.

What was the lowest reading that you got under any one of these four scenarios, by way of the strength factor?

A Well, see, the lowest strength that we calculated, was the little over 3.1.

Q Okay. So, the lowest that this tested out to be was 3.1 times as strong as it needed to be to support the load?

A That's correct.

Q The boxes down below that, the vertical displacement boxes, there's four of them, one for each of these load-case scenarios. What --- what --- can you explain those to us?

A Again, that's just a calculation of how much the arch deforms when you load it.

Q Uh-huh.

A Like, all --- everything, all structures deform. If you start squeezing on something, it --- it compresses, or if you stretch it, it elongates. So, everything moves. It's simply a --- a graphical representation, somewhat simplified, of the amount of vertical movement that the arch experiences. And these dimensions are --- I believe they're in millimeters. Yes, that's right.

Q In layman's terms, what do these results tell us?

A What it means on all of these range --- different assumptions that we made about the size of the debris pile. It tells us that the --- the greatest vertical movement occurs in the center of the arch, in the roof.

Q Uh-huh.

A And that even under the most conservative assumption, the amount of movement, downward movement, is only a millimeter. Which is about the size of penny, the thickness of a penny. About a millimeter. So, it's an imperceptible movement. If you're standing on the floor of a 23-foot high --- you know, if I tell you it moved down that much, you wouldn't notice it.

Q And they were under the --- the assumptions that the debris pile was far greater than what you saw?

A That's correct.

Q I'd like to move on to the --- the very next exhibit

or Figure 15. Can you tell us what --- it says, "Limits of Hypothetical Tunnel Collapse." What do you --- what do you mean?

A Well, what I was doing with this particular Figure, basically, I got to a point in my study where I concluded, really, that the --- the arch --- the concrete liner was performing well with its --- within its strength and its intended function. And, you know, I was concluding, really, there's very little likelihood, in the near future, that it --- it was about to collapse.

Q Okay.

A But I was just postulating, you know, on the --- on the limb, if you like, that let's just suppose that it did, and we started getting --- you know, a hole appeared in the roof, that was, you know, about 16 feet across and stuff starting to slowly, you know, fall in, pieces were detaching and falling in, and how high might a chimney go?

Q A "chimney," what do you mean?

A Well, it --- say, if we --- if you imagine a hole forms in the roof, and the immediate --- material immediately around the hole falls down to the floor, we're left with a slight depression in the roof.

Q Okay.

A And it exposes more material that could fall down. So, it rises a little more. That void rises a little more.

Assume it makes a cylinder, just continually going up, where there's more and more material starts to flake out and fall down.

Q Okay.

A Okay. That's what I mean by "forming a chimney."

Q Okay.

A The material that falls out, tends to occupy more volume than intact, because there's move void space created. So, I said, "Well, let's assume that it falls down out of this chimney and it forms a cone pile, like a sandpile, if you like, in the Tunnel. It fills the Tunnel up. How high would it keep going before there'd be no more space for the ground to fall into?"

Q Okay.

A Okay. Typically, the amount of volume increase is 40, 50% This would be the amount of increase in volume we'd get. That's where it comes from. Basically, based on those calculations, what I was cap --- what I'm illustrating in this Figure, again, I've got a graph paper with elevation shown upper, left-hand column.

Q Uh-huh.

A And after a horizontal scale across the bottom. And I've drawn to scale the dimensions of the Tunnel and its elevation, floor elevation and I've drawn lines across the graph further out, which represent the elevations of the

roadways.

Q Uh-huh.

A And so, the --- the height of the column that I've illustrated there (indicating), is a representation of how high that chimney might go before there was no more air space for stuff to fall into. And it effectively --- that's why I assume it --- I call it "choking itself up." There's nowhere else to go with it.

Q Okay.

I'd like to take you to the conclusions in your report, trying to wrap things up. What --- what were you able to ascertain, as to how the Tunnel was constructed and how that may affect the long-term structural integrity of it?

A Okay. From the geologic study, we knew that the Tunnel is hewn from rock. There's largely a fairly competent sandstone over much of its length, with more claystone and shales towards the north end. So, it's --- it's pretty lightly given, what we know about the construction methods in that period, that it would have been --- they would have used explosive means. They'd have drilled holes into the rock, filled them with explosive material, detonated it. That would have broken the rock out, and they'd have excavated it out.

From what we've seen, with the probe hole drilling and the fact that the concrete appears to end right at the rock, even in the crown, it would appear that they most have formed

the shape of the arch and the walls, and probably laid a veneer of brick over the arch and pumped concrete into the void, which is --- which is pretty favorable, as far as long-term performance of the ground is concerned, because there are fairly few air pockets for the ground to start weathering into. And so, that limits the amount of weathering it --- it --- it means the ground's better able to support the loads that are created, as a result of the Tunnel being there.

Q Moving on, what were you able to cons --- conclude, regarding the structural integrity of this Tunnel and the lining of it?

A Well, like I mentioned before, the --- generally, the condition as we see it, is in my opinion and looking at a number of old tunnels, is really in very good condition, very little sign of anything, any loose material coming out of the arch.

The calculations which I carried out, assuming a range of possible material strength, to try and, you know, fully bound, you know, the possible scenarios out there, was that the arch is needed, you know, had a function, there was a good reason for putting it there, and that it's performing well within its strength capabilities to support the ground around it.

And so, as I say, in my opinion, there's --- the structural integrity is very good, and there's very little likelihood of a sudden collapse in the foreseeable future.

Q Okay. How about going on into the future? What's your prognosis for the long-term integrity of this Tunnel? I note that there was some snow and ice deterioration.

A Well, as I say, the --- as far as --- I --- for a collapse to occur, there would be --- have to be some kind of process that would have to occur, that deteriorated the structure of the concrete, would start breaking it out, would cause it to start, you know, become softer, weaker or that sort of thing.

And really, where those two locations in, were sufficiently far from the portals, it's a pretty --- pretty benign environment. There's not too much that co --- the sorts of things that --- that one could expect would be the sort of weathering process as we see at the portals, where water starts collecting, seeping into the --- seeping through the concrete, and then, you know, freezes in winter and goes through a long period of cyclic freezing and thawing to --- you know, to be deteriorated.

You know, when we did Barry Street Tunnel, here in town, there, there was a slight void between the brick arch and opening, and that ground water had come back in. And so, there was some deterioration, you know, a couple of hundred feet in. But this Tunnel, we see that it appears they poured concrete all the way up to the limits of the opening, and so that's blocked off the possibility of water traveling up the

liner, you know, to deep in. And that's why we see at East Brady, the --- the ice deterioration is very much localized to close to the portals.

Q Hypothetically speaking, if there were a collapse of the Tunnel, do the state roadways above --- are situated above the Tunnel, rely upon the continued integrity of the Tunnel for their continued support?

A I don't believe so.

Q And, explain that, please.

A Well, as I say, I --- I carried out an analysis, assuming that there was some sort of failure in the Tunnel that might propagate up towards the surface, and, in my opinion, with the --- with the bulking of all the material that would fall in it, there would cease to be a void into which this material could fall. You'd get no closer than about 90 feet from the roadway, even under those unlikely circumstances.

MR. WALL: I have --- let me just double check here. I have no further questions. Thank you, very much.

JUDGE NEMEC: Cross-examination?

MR. SHARP: None from the Department, Your Honor.

MR. PRICE: I might have some questions after Mr. Smith, but I don't right now.

JUDGE NEMEC: Okay.

Go ahead, Mr. Smith.

CROSS-EXAMINATION

BY MR. SMITH:

Q Mr. Elliott, how does your report and your conclusions relate to the testimony given this morning concerning the geology? Is it dependent on this testimony?

A We used the findings of the geology to determine the nature of the ground we were in, the type of rock we were in, rock units.

Q Now, you talked about working on other tunnels in this area. When you've worked on tunnels and worked on construction, have you used core drilling?

A I have used core drilling.

Q Have you used core drilling from the surface down?

A Yes, I have.

Q And on what job or jobs have you used that?

A We --- on the big wall in the tunnel out at Steubenville, they did a lot of core drilling.

Q How about these tunnels that you referred to?

A I haven't done core drilling on all of them. I've done a lot of probe hole drilling of the same sort that I used here.

Q And you said you haven't done core drilling on all them, so apparently, you've done core drilling on some of them, is that correct?

A I mentioned when core drilling was used for part to

provide some of the data for the stuff out at Steubenville.

Q Okay. Now, the tunnel's out of Steubenville, is that it?

A It's a drainage tunnel beneath the wall, that's right.

Q Why did you use core drilling?

A Because we are wanting to get a lot of information. The hills there, there were not necessarily good exposures of the rock, which we --- so, we get that information. We wanted to be able to look at some of the ground water levels. We wanted to --- we were doing inf --- getting information for the retaining wall design, as well as the tunnel, so we could get some samples for looking at the stability of the hillside.

Q How deep did you core drill?

A I think the deepest one there was about --- this is going some years back --- possibly 300 feet.

Q 300 feet.

A 250, 300 feet.

Q Would that be the approximate overload on this Tunnel and one of the intersections?

A I think I mentioned that one of the intersections is about 360 feet.

Q Could core drilling have been done in this instance?

A It could have been.

Q And could it have been done in both intersections?

A It could have been.

Q And would it have given you more accurate information, geological information, on which to base a judgment?

A Not necessarily.

Q I didn't ask "necessarily." Would it have given you?

A No.

Q Could it have given you more accurate information?

A It would have given me precise information about the thicknesses of the rock unit, at the location I drilled the hole, but that's all it would tell me.

Q I see. And the precise information, really, is what you need, in running your calculations, is that correct?

A No.

Q You don't use precise information?

A No, because the ground varies. The ground has variable strength. That's why we look at ranges. We look at worse case and --- and best case.

Q Is that because you might be wrong in the assumptions?

A No, because nature is variable.

Q When you say, "Nature is variable," is there a variation in the thickness of the strata, say of the sandstone that runs through there?

A I'm sure there is.

Q In other words, there's some places that could be quite thin and others it could be quite thick, is that correct?

A I don't --- in this particular unit, I don't think there's many places it would get quite thin, but it would vary in thickness.

Q There wouldn't be many places, but there could be some places, is that correct?

A Could you be more specific?

Q You said there wouldn't be many places in which it was quite thin, so, there must be some places in which it could be quite thin, is that correct?

A I'm sure if I went into Ohio and found the same geologic unit, it might be thin.

Q I'm not interested in Ohio, at this stage. I'm interested in this specific instance. You said that "not many," which means there must be some. In other words, there could be some places where it was thin, is that correct?

A I doubt it's that thin at the site.

Q I didn't ask you whether you doubt it. I asked you whether it was correct that at some places it could be thin?

A I don't think it could be thin at the site.

Q Well, you just testified in some places it would be thick and some place it would be thin.

MR. WALL: I'll object to the form of the question.

JUDGE NEMEC: the transcript will reveal whether --- what he's said.

BY MR. SMITH:

Q Let's talk about coal. Do you know how many strata of coal there was on this overburden?

A Without --- I don't have it as a number in my head. I'd have to check the stratigraphic column. It's not a number I keep in my head.

Q Well, let's assume for problem purposes, that there's testimony on the record --- were you here this morning?

A I was.

Q Did you hear the gentleman testify that there's as many as 12 strata of coal?

A I did hear that.

Q Okay. Do you think he was telling the truth when he so testified?

A I assume so. He was under oath.

Q When you use the word "assume," you're whole study is based on the assumptions that he had --- the assumptions of what he has in his report, is that correct?

A It's based on the findings that --- based on his findings.

Q His conclusions?

A That's correct.

Q Your --- your opinion is based on his --- what he represents?

A In part.

Q And so, he has represented there's 12 layers of coal.

A Okay.

Q Now, layers of coal are not always of uniform thickness, is that correct?

A That's correct.

Q So, there could be layers of coal and above this tunnel that are very thick and some that are thin, is that correct?

MR. WALL: Object to the form of the question. I don't know what he means by "very thick."

BY MR. SMITH:

Q Okay. Let's take the coal strata. Which coal strata are you familiar with?

JUDGE NEMEC: Coal what? I'm sorry.

MR. SMITH: Coal, c-o-a-l strata or vein.

THE WITNESS: Okay. Well, he was talking about, was it the Upper Freeport Coal, that's been strip mined at the area?

BY MR. SMITH:

Q Well, there is some area where the Upper Freeport actually covers underneath these intersections?

A I believe at some of the upper elevations it might.

Q Okay. Do you know thick the Upper Freeport is?

A I believe testimony was given this morning it was between 3 and 6 feet.

Q So, it could be 50% in this instance: It could be a minimum of 3 and a maximum of 6, is that it?

A Yeah.

Q Now, how about the other 12 stratas? What other stratas of coal do you notice there?

A Well, there's --- there's the Lower Freeport, there's the Upper Kittanning, there's the Middle Kittanning.

Q Let's say --- let's say each of them as you go down, and tell me what you approximate the thickness to be.

A I didn't do any estimates, that's why I commissioned a geologic study. I can't answer you.

Q Well, didn't you use the estimates?

A No, because I didn't need to model the whole hillside that far up into the ---

Q How do you know you didn't have to?

A Because the results of my analysis showed that the displacement experienced by ground, say 2 diameters away, was almost --- was very little.

Q Now, you testified that part of your testimony is this cone or this column that runs up. The existence of coal in that column might have an effect, is that correct?

A Not really.

Q No effect, at all?

A Not really.

Q Is there a strength characteristic of the coal?

A Yes, there is.

Q Okay. Did you run that into your computer calculations?

A No, I didn't. I didn't need to.

Q Well, how --- how close --- how did you come to your conclusions on your debris then? Different debris results in different buildup, is that correct?

A It's pretty much the same. It's about 40, 50%.

Q Sand --- sand is the same?

A It's about 35% porosity in the sand.

Q Coal is the same?

A Yes, possibly higher in coal.

Q Now, in the column, itself, that's running up, does the weight or strength characteristics of the column have anything to do with the amount of debris or the --- the ---

A Not really.

Q Not at all?

A No, because it's a weathering process. The rock is weathering and small pieces start flaking off. It's not an overstress situation. It's --- materials weather and they start flaking off and drop ---

MR. SHARP: Your Honor, I'm sorry. I --- it's an objection. I'm --- I'm not sure what we're talking about. Are we talking about --- for clarification purposes, are we talking about the hypothetical from Figure 15, or are we talking about the results of the loading from, and forgive me, I --- I don't know them off the top of my head ---

JUDGE NEMEC: I assume that we're talking about the hypothetical in Figure 15.

MR. SHARP: Yeah. And I --- I --- and I only ask that, because there was reference to both the debris pile, which was the discussion of Figure 14 and the capacity of the arch, and the --- and the hypothetical Tunnel collapse. I thought they were two separate things, and I --- I just --- I didn't understand it. It might just be that I don't understand. I just want ---

MR. SMITH: Do you see the term "bulking?"

MR. SHARP: So, you're talking about the hypothetical Tunnel collapse?

MR. SMITH: Bulking and debris involve the same material.

JUDGE NEMEC: Yes, sir, but you --- are you referring to the -- the study at Figure 14 or the study at Figure 15?

MR. SMITH: Well then, can't we consider them together?

JUDGE NEMEC: No, sir.

MR. SHARP: That's why. I just --- I apologize for the form of that objection. I just wanted the record to be clear

as to what was being discussed.

JUDGE NEMEC: It's two different things. Because you were talking about the cone or the column, I assumed it was 15, and it has to do with the debris falling into this void and gradually filling up.

THE WITNESS: That's correct.

JUDGE NEMEC: But 14 also talks about debris and the effect of it, but it's the effect of the debris on the liner and the strength of the liner.

BY MR. SMITH:

Q Now, let's talk for a few moments about your probe of --- probe hole drilling. Now, I had some difficulty understanding it. Do I understand that the total number of holes drilled is 16?

A That's correct.

Q And, I see a metal vertical on the sidewall. Would this --- would you be drilling on the same line, 16 holes, from one side of the Tunnel to the other, in a fan shape?

A Eight holes at each location, total of 16.

Q Okay. And they were on the same alignment, is that correct?

A Yes. So, if you would imagine cutting a slice across this room, they'd all be in a plane of this room.

Q And so, would you then ---

A It's like I've shown it on this exhibit here.

Q Well, that's --- the exhibit's two dimensional, and I was having a little problem with that.

A It was drilled in a two dimensional section across the Tunnel.

Q Okay. So that there was no drilling done five feet beyond this, beyond that, five feet in either direction?

A No.

Q No other probe hole drilling throughout the whole Tunnel?

A No.

Q Now, during this probe hole --- there's very limited probe hole drilling you did in just two places?

A That's correct.

Q You found debris, is that correct?

A At one of the locations, we found a small amount of debris.

Q And where was that debris located?

A It was on the --- toward the right-hand side of the section of Tunnel beneath State Route 2023.

Q Is that --- in which type of rock was that?

A We were in some of the softer claystone-type units, embedded claystone units.

Q Okay.

A Claystones and shale.

Q And you found --- was that debris on the side or on

the top or both?

A It was on the arch.

Q On the arch?

A Yes. Backside of the arch. What I call the backside of the arch. As you drill through it, it's what you find at the back.

Q And, there's no other drilling done throughout the Tunnel by you?

A No.

Q Now, where was the water that you say you discovered?

A Again, we found that in the lowest holes, on either side, at that same station, beneath State Route 2023, and we found it in one hole beneath State Route 68.

Q So, you actually found it at both locations or sites, is that correct?

A Yes.

Q And that was --- that location was designed to identify with the two crossings above there, is that correct?

A That's correct.

Q Now, is it equally possible that, if you went 10 feet away, in either direction, you would also find debris?

A Good chance.

Q Good chance. Okay.

And if you went 10 --- the same 10 feet in either

direction, you would also possibly find water, is that correct?

A There's a good chance.

Q What do you consider a good chance, 50 --- 60%, 75%?

A Probably better than that.

Q Well, 90%, 85?

A I wouldn't really wish to speculate as to a quantitative number. It's a qualitative thing. I think there's a good chance that you'd see it.

Q So, that's --- I think I said 6 ---

A We should not be surprised, if you went 10 feet up and drilled another eight holes, that one of them would encounter water.

Q And --- well, in your instance, you had both encountering water and one of them debris, is that correct?

A We found some debris in some of the holes.

Q Now, if there were a collapse 10 feet from where you did your holes, because of water and debris, that might affect your judgment, correct?

MR. WALL: I object. Well, would --- this --- this --- I'll withdraw it.

JUDGE NEMEC: I don't --- I don't understand the question.

BY MR. SMITH:

Q If we went 25 feet in either direction from where

you drilled your probe holes, if there were a collapse in that area, could that affect the support under these two highways?

A You say if there was an existing collapse?

Q No. If we were to go 25 feet to the right of where you drilled your holes ---

A Right.

Q --- (Continuing) --- and there were a collapse 25 feet away from there ---

A Okay. When --- when did this collapse occur?

Q In the future?

A Okay. So, a hypothetical collapse occurs in the future, 25 feet away?

Q Yes. Could that affect the road surface --- could that affect the area above?

MR. WALL: What area above?

MR. SMITH: Where the road surface is.

THE WITNESS: No.

BY MR. SMITH:

Q How wide does a cone become or can a come become?

A Generally, it --- it would either stay a similar size, or it would start decreasing in height, I believe.

Q Well, aren't the circumstances in which ---

A It's not something that would fan out sideways because the ---when you fan out sideways, there's a bigger and bigger volume of material that's going to fall into a finite

hole.

Q Now, what's the largest space that you're familiar with, with this site or with a collapse? In other words, would it be 10 feet across, 25 feet across, 30 feet across?

JUDGE NEMEC: It's going to be --- the biggest collapse we could deal with here would be the 30 feet, because that's the --- the --- the width of the Tunnel. That's the void you'd have to fill.

MR. SMITH: In some instances the Tunnel is bigger than 30 feet. We have an incident ---

JUDGE NEMEC: No.

MR. SMITH: Inside the Tunnel is 30 feet.

JUDGE NEMEC: Yes, sir, the width.

MR. SMITH: The width. And in some instances, he said, there's walls that go out another five or six feet on each side, or 10 feet, nine feet.

JUDGE NEMEC: What --- you mean --- the ultimate --- you know, ultimately, we're dealing with is whatever the ultimate width of it is, and I guess it could be as much as --- looking at the one Station, it could approach 40 feet, I suppose.

MR. SMITH: Maybe it could be a parallelogram instead of a circle or a square. And being a parallelogram, running down the center of the Tunnel ---

JUDGE NEMEC: Yeah.

MR. SMITH: --- (Continuing) --- it could expand in that direction.

JUDGE NEMEC: But we're talking about a collapse underneath one of these roads.

MR. SMITH: Well, I'm --- that's what I'm trying to determine.

BY MR. SMITH:

Q Now is it possible that such a collapse could extend down the center of the Tunnel, making a larger base --- down the center of the Tunnel first?

A If --- if it extended along the length of the tunnel, then my assumptions about height are too conservative, 'cause I'm assuming a cylinder falls down and it spreads out along the Tunnel because there is no collapse on either side.

If you're saying that there's this longitudinal collapse occurring, then my calculations are way too conservative, because, you know, there's a doubling up of volume.

Q I didn't say that it was necessarily longitudinal, but the collapse could be along longitudinal lines. It's going down ---

A That's what I thought you said.

Q Doesn't need necessarily to be limited in width. It could be wider and longer. Is there any reason why ---

A That's what I'm saying. If it was longer --- if it was longer, my calculations would be too conservative, because I've assumed some of that available space in my calculation that --- that this material can fall into. If it's a longer

one, that space wouldn't be available.

Q As an engineer who --- you drive around quite a bit in your work, don't you?

A Yes.

Q And you use 79?

A Yes.

Q Are you familiar with the collapse of 79, south of Pittsburgh?

A No, I'm not.

Q You're not.

You think it's possible for a --- an opening the size of a mine or an opening the size of tunnel to extend up --- or a collapse to extend up greater than the distance that you're showing on --- on your exhibit --- or Figure 15?

MR. WALL: You mean at this Tunnel?

BY MR. SMITH:

Q I'm asking you ---

JUDGE NEMEC: That's much too broad a question. Much too broad. And --- and if I recollect correctly, what happened on 79 was a longwall, where --- where --- where the --- there was an enormous amount of space was --- was excavated in --- in --- in the coal. I mean, it's nowhere --- no way --- no shape or form could compare with what we're dealing with here.

Yes, sir?

MR. SHARP: I --- I was under the impression --- I'm not

familiar with any 79 collapse. There was recently new mining under Interstate 70, south of Pittsburgh, that caused a collapse. I --- and that's why I would object to any questions regarding it, only because it's really totally different. That was new longwall mining that was freshly done on an interstate highway, and I just don't --- it's really completely different from, I think, what we're talking about here.

JUDGE NEMEC: I --- I can't --- can't conceptualize how longwall mining could be --- be comparable to what we're talking about here.

MR. SMITH: Well, this was an old mine, it wasn't longwall mining, as I understand.

THE WITNESS: Well then, I don't know anything about the 79 collapse.

BY MR. SMITH:

Q Now, in your knowledge, what is the highest column that you're familiar with in a collapse?

A I haven't dealt with many collapses. The only collapse I was asked to go and look was beneath the West Point Tunnel. It went up about 10 feet.

Q That's the only collapse you have any experience with?

A Right.

Q Well, how can --- how can --- tell me how you can

predict the limitation on the collapse in this instance?

A Because, the amount of bulking that occurs when intact rock collapses is fairly well known, within ranges. 40, 50% is a common value used in the industry, to figure out how much rock bulks up. You know, if contractors would have to excavate it here and take it there, they have to figure on a lot more than the physical volume that they're excavating. And then it just becomes a matter of geometry.

Q Well, at what point does it support the ceiling and the overburden? How do you know?

A Because it's a geo --- geometric problem. If I have a unit volume that has now got to occupy 140% of that volume, and there's only this little void at the bottom for it all to fall into, there's only so much volume it can ---

Q Are there any treatises on this?

A I don't know as you need a treatise on it. It's a geometry problem. It's a high school problem.

Q I asked you if there are any treatises on the bulking effect ---

A I'm sure there are papers people have written about the bulking.

Q But you didn't rely on any of them?

A I didn't refer to them on this occasion.

Q In other words, this is --- this bulking idea is something you've come up with for this particular Case?

A No. Bulking of rock is a fairly commonplace thing people know about. Anybody who's been digging, you know, drains in their yard, will know how much bulking the soil goes when you dig it out of a hole.

Q But for stopping a collapse?

A Well, then it just becomes a problem of geometry.

Q But you have --- you --- you're not familiar with any specific cases of that having occurred, are you?

A I can't say I've reviewed any calculations.

Q That's what I mean.

A That --- similar calculations.

Q Or similar specific incidents?

A Yeah, I probably haven't looked specific into them, but it's just a problem of geometry.

Q So, what you're doing now is, you're speculating, on a geometrical basis, a factual situation and a conclusion drawn from that, and you don't have any specific experience or specific technological treatises that make any reference to this effect, at all, is that correct?

MR. WALL: Object to the form of the question. It's compound and it's argumentative.

JUDGE NEMEC: Sustained.

MR. WALL: I think we've covered this.

BY MR. SMITH:

Q Are you familiar with any authorities which give any

specific example of bulking as stopping a collapse?

A I can't think of any specific references right now that I could cite to you.

Q And you didn't do any research on that, relative to this particular Case?

MR. WALL: Objection. Asked and answered.

BY MR. SMITH:

Q Did you do any research work on bulking as stopping a collapse, relative to this particular Case?

MR. WALL: Same objection.

JUDGE NEMEC: Well, that's all his testimony is. His testimony is the work that he did to analyze the situation present at this location.

MR. SMITH: My underst --- my understanding is that ---

MR. WALL: What do you mean by "research" then?

MR. SMITH: Technical research, historical research; anything that refers specifically to bulking as stopping a collapse of land.

JUDGE NEMEC: Well, I think that that's what he --- he's testified to, the effect of bulking, as he has learned that it occurs, as a result of his experience, his education and the work that he's done on various projects.

MR. SMITH: That's right, Your Honor, he has testified that rock bulks at a certain percentage rate, and he can calculate the height at which it does this, but he has not

come to any --- he has not been able to testify, on a professional basis, that this will stop a collapse of earth. That's two different things.

JUDGE NEMEC: I believe that's the extent --- I believe he has testified to that.

BY MR. SMITH:

Q This Figure 15 is actually based on an assumption, is it not, that bulking will stop a collapse?

A It's based on a calculation

JUDGE NEMEC: Let him finish. Go ahead.

THE WITNESS: That --- that volume of rock falling out of a roof, into the space provided by the tunnel, that there's a balance of volumes after that rock has bulked up.

BY MR. SMITH:

Q But you have no authority for the conclusion that it will stop the collapse of that Tunnel?

A I believe I do. I believe that's --- it's a common sense issue, and it's --- it's out of my expertise to make that evaluation.

Q You've never made that evaluation before, have you?

A I haven't had to.

Q So, this is the first instance in which you've advanced this theory, is that correct?

A It's an application of geometry.

Q Would you just answer my question? This is the

first instance in which you have advanced that theory?

A Yes, it is.

Q Do you know of any other person or persons in your profession that have advanced this theory?

A I haven't asked them, so, I can't answer that question.

Q How long have you been engaged in this business, this profession?

JUDGE NEMEC: He's testified to that, sir.

BY MR. SMITH:

Q During all your time in your profession, you haven't heard about this, or haven't read about this theory?

MR. WALL: What "theory" are you talking about?

MR. SMITH: The theory of bulking stopping the collapse of earth.

THE WITNESS: I can't recall.

MR. SMITH: Thank you.

BY MR. SMITH:

Q Now, why did you use four scenarios on strength?

A Because I wanted to look at the influence of the range of possible strengths that there might be.

Q What was that exhibit number, do you recall?

MR. WALL: I think that it was Number 10.

JUDGE NEMEC: 14.

MR. WALL: Yeah, there's two different ones: Either 10

or 14.

BY MR. SMITH:

Q Now, each of those --- why did you use 4?

A Sorry?

Q Are there 4 different possibilities in this situation?

A No, I was simply representing in my calculations, a range of possible --- oh, for 14?

Q Let's take 14 for instance.

A Alright. Sorry.

There were 4 --- just --- again, 4 scenarios, that I felt reflected a range of possibilities from likely to unlikely.

Q Did you use 4 because you were not aware of the specific factual circumstances there?

A I presented 4 because a lot of them ended up being duplicates.

Q What ended up a duplicate?

A Oh, you look at some of the other combinations, and essentially it's giving us all the same results. It's almost identical. You see how the results for the two in the middle are almost identical.

Q But, you did not have any specific grounds for making the specific low calculation number 1, is that correct?

A Correct. That was a hypothesis. Let's assume that it's --- gets that ---

Q That's enough.

MR. WALL: Your Honor, I --- I'll tell you --- I can't. I'm going to strenuously object to this questioning. This attorney has repeatedly cut witnesses off in the middle of their questions and told them he's not interested in their response and wants to move on. I would please ask that he extend me the common courtesy of affording me the opportunity to finish my objection and afford the witnesses the same courtesy when answering, please.

MR. SMITH: I'll try and conform with that, Your Honor.

JUDGE NEMEC: Alright.

Anything you wish to add to your last answer, sir?

THE WITNESS: No.

JUDGE NEMEC: Go ahead.

BY MR. SMITH:

Q Now, in Load Case Number 2, did you have any specific data as to the thickness of the sandstone, the claystone and the sandstone in that area, upon which you based your analysis?

A For the analyses in Figure 14, all that we were including was the geometry of the arch and the height of the debris pile.

Q This relates to the height of the debris pile?

A Yes. That's the input for this analysis. The other --- the fact that I show sandstone and claystone there is just

purely illustrative. It's the debris pile that's of interest because this is stand alone.

Q That's --- I think we already have that.

Now --- so, the debris pile of 14 foot, that's an assumption, is that correct?

A Yes.

Q And the debris of 8 foot 5 inches, that's based on an assumption?

A That's correct.

Q And the debris pile of 8 foot 5 inches on Load Case 3, is also based on an assumption?

A That's correct.

Q The debris pile of 3 feet, on Load Case 7, is based on an assumption?

A Yes, it is.

Q Why were you unable to make specific examples?

A Because the --- we found very little debris on the outside of the liner, that would have been even less than this.

Q Oh. Out of two holes on the top of the liner, you found debris in one of the areas that you tested, is that correct?

A Yes, that's correct.

Q How deep was the debris?

A Maybe a --- I can't be too precise, but maybe a

foot, 18 inches, something like that.

Q Did you make any written calcula--- did you make any written notes to prepare this report from?

A I --- yes, I have records of all the observations we made while we were there.

Q Why didn't you bring them in?

A I didn't think I needed to.

Q Well, how can we find out the height of these debris piles and the amount of water left ---

A You would have to back to Figure Number 6, start scaling off the drawing.

Q Now, from Number 6, how do you --- how can you tell what the height of the debris is?

A Well, this is drawn to scale. Each of these squares ---

Q Well ---

JUDGE NEMEC: Would you let him finish, please?

MR. SMITH: That's why I shut up, Your Honor.

THE WITNESS: Each of these squares is 2 feet by 2 feet. So, on those holes on the right-hand side, you can see there's a slightly shaded pattern, immediately behind what I'm representing as the lining, with a "B" written in it, which is an irregularly oversized hole, broken hard rock, containing possible separations. That's where I considered as part of a debris pile.

BY MR. SMITH:

Q What do you mean by "possible separations?"

A Well, there's a --- there's a --- there's a --- you go through a zone where there's a --- there's a small void. That might be a separation in the rock, or it could just be a void between to blocks of rock sitting next to each other.

Q Is that high --- what are those highly broken?

A It means if --- it's broken up into --- to small chunks of rock, from the size we were looking at in the instrument. You know, we're looking at, you know, pebble size pieces, you know, about the size I'm showing there with my fingers. It appears as a really big piece of material.

Q Now, you testified earlier that explosives were used to construct this Tunnel, is that correct?

A I think I testified that I suspected they were used.

Q You suspected. And that's part of your assumption, or part of the data on which you formulated your opinion?

A No.

Q It's not?

A No. I don't need to know precisely what method of excavation they used.

Q Well, can you tell us, the explosives create larger cracks in the overburden?

A The explosives are used to break up rock by forming cracks in it, that's correct. But that would have --- most of

those cracks are excavated out with the material that you took out.

Q Do you know whether or not they had been, in this instance?

A I saw --- from the probe holes that I saw that we drilled, I saw no evidence of explosive cracks.

Q And they were how big, the probe holes?

A They're an inch and 5/8 diameter.

Q Could there have been cracks that were 5 feet away, that you couldn't see?

A I was looking a hole, an inch and 5/8 diameter, that was about 10 feet long. That's my --- that's what I was looking at.

Q And what was the frequency ---

A If it --- if it --- if it was 10 --- if it was 5 feet spacing, you know, up the length of the hole, I'd have seen it. It was 5 feet off, I might have seen it in the next hole I drilled, I might not.

Q Around a certain circumference?

A That's correct.

Q Would you reasonably expect that if explosives were used, that there were cracks expanded in the rocks above?

A Locally it might have done, and those blocks would likely have fallen out as a result, when they were building it.

Q And some of them may not have fallen out, too, is that correct?

A They may not have done.

Q And you don't know whether they have or have not, is that correct?

A In what we've seen in the probe holes, other than the small debris that we're seeing, there's no other signs of blocks falling out.

Q What is the effect as far as transmitting force beyond the point of explosion into rocks? How many feet does that go, as far as the ability to create cracks?

A Well, insofar as they space holes in a typical round, maybe 18 inches apart, possibly 12, 18 inches.

Q How about in 1915?

A Sorry?

Q In 1915, instead of using the type of explosives used today?

A Well, they were still --- nitroglycerin was still --- was still being used for 35 years, so they could well have used some strong explosives.

Q But it could go beyond 18 inches?

A In confined rock, possibly not.

Q But possibly, yes, too, is that correct?

A One has to always be open to the possibilities, but it's unlikely.

Q You say you did some work around Harlan, Kentucky?

A Yes. I did some modeling of the sort I did here for those tunnels.

Q Now, Harlan, Kentucky is a coal area, is that correct?

A I believe it's in the coal belt.

Q Did you do any work in relation to the coal or coal mining in that area?

A No, I didn't.

Q Did you do any studies which related to the bearing capacity of the coal, relative to the tunnels that you were working on?

A No, I didn't.

Q Is this the first instance in which you have been involved in the bearing capacity of coal, relative to a tunnel?

A I don't know if bearing capacity of coal came into this study of this Tunnel.

Q It's part of the structure, isn't it?

A But I believe I've testified already that, the coals were beyond the zone of influence of this Tunnel.

Q Well, we don't know, unless the Tunnel collapses, is that correct?

A The whole point of carrying out calculations is to make some predictions as to the zone of influence, how much

movement is experienced in the ground. And the calculations showed that, typically, if we get about 2 ton of diameters away, there's hardly any movement in the ground.

Q You mentioned a computer model. Is this a commercial computer model, or one that you have designed?

A It's commercially available.

Q And what is the computer model?

A It's called "Phases."

Q Would you spell that, please?

A P-h-a-s-e-s.

Q Phases. And who's it produced by?

A I believe it's distributed by the University of Toronto.

Q Does it req --- does it provide for specific input relative to the strata and geological strata above the Tunnel area that you're talking about?

A Yes, it does.

Q But you didn't feed in specific data, did you?

A Yes, I did.

Q What specific data did you feed in?

A I fed in specific data on unit weight, data on the strength of materials and data on the elastic properties.

Q Now, how many models did --- or how many examples did you run through this computer?

A I think that's illustrated in Table 2, here. 16.

Q 16. Why did you run 16?

A Because I --- that's as many as I needed to do, to reflect the high and low ranges of the different material.

Q You had 16 different specifics, is that it?

A That's right.

Q Well, that doesn't sound very specific, when you have 16. Does it sound specific to ---

JUDGE NEMEC: That doesn't make any sense, sir.

BY MR. SMITH:

Q You ---

MR. SMITH: I'll withdraw and rephrase the question.

BY MR. SMITH:

Q You ran 16 different possibilities, is that correct?

A That's correct.

Q Why did you run 16?

A Because I felt with 16, I had run the full gambit of possibilities, from the most optimistic to pessimistic.

Q But, you didn't have, as I unders --- did each one have a different specific to it?

A Yes, it had a specific value input to each one.

Q And each specific was different?

A That's right.

Q How can you tell which is right?

A I don't need to tell which is right. I just need to make sure that I've bounded --- bounded the --- the solution.

Q Okay. Now, when I look here at Table 2, I see sandstone. How much sandstone is involved, thickness of sandstone?

A I think on --- on this particular model I was using, I had assigned a thickness of sandstone that was the height of the excavation. So, it would have been about 25 feet.

Q Now, was that consistent through all 16 of the examples?

A Yes.

Q And, where did you get that number from?

A Assimilation of the geologic information that was --

Q A simulation?

A Assimilation.

Q Oh, assimilation, not a simulation.

And where does it say that they --- there's 16 foot of sandstone?

A It was a --- it was based on geologic information provided to me about this.

Q Excuse me. It's not in the report, is it?

A No.

Q And you haven't provided us with any notes or measurements, have you?

A Not in the report.

Q Okay. Do you have something at your office that

shows that there's 16 feet of sandstone?

A Possibly. I --- I'd have to go back and look at the geologic information I was provided. But 16 feet is a representative thickness.

Q I asked you where did it come from? Do you have any specific written notes or communication that says 16 foot of sandstone?

A I believe that came with the geologic information I provided.

Q But do you know?

A Insofar as I can't picture the words in my mind, I can't say that I absolutely know.

Q So, this may be a calculation on your part, is that correct?

A It's a reasonable representation of the information that we had.

Q What makes it reasonable? You haven't related to any specific notes, or any specific writings which say 16 feet.

A We can look at the pictures that we have of the portal. These rock units that you see here, are far in excess of 16 feet.

Q Which reference are you making?

A This Figure 4 is a view of the sandstone, the portal. This particular section, I'm assuming that the softer

material ---

Q Which picture are you referring to?

A The upper picture.

Q There are two.

A Well, it's a combined --- combined mosaic, isn't it? The same hillside.

Q It's not that way at the other end, is it?

A Pardon?

Q At the other portal, it's not 16 foot of sandstone, is it?

A No, but we're not dealing with the other portal.

Q Well, I'm just asking you first, at the other end of the Tunnel, there's not 16 foot of sandstone, is there?

A No, because the sandstone units start moving above the --- the roof of the Tunnel at the south --- at the north portal.

Q So, it varies from place to place, is that correct?

A I believe that's --- we've heard testimony to that effect.

JUDGE NEMEC: Yes. The testimony, as I recall it, is that the portals are at different elevations and are located in different rock formations. But you have a chart in Figure 4, which is to scale, which gives you approximation, at least, of --- of the heights of the various formations, if you care to measure it off. I suppose you could use that.

BY MR. SMITH:

Q This profile that you ran was how many feet away from that portal?

A On these models? This was ---

Q No. This profile, where you did you boring ---

A Yes.

Q --- (Continuing) --- how many feet is that away from this par ---

A This represents the geology that was about 800 feet from the south portal.

Q How did you arrive at that geology?

A Because, we know from these --- from the photographs, this is the --- the softer unit that's shown beneath this overhang is what I'm interpreting as a worse case, as being in the roof of the Tunnel.

Q I'm just talking about the sandstone.

A Well, below the --- this --- that unit, we have --- from this picture, shows us to have a considerable thickness of sandstones, siltstones. I chose 16 feet. I felt I was fairly erring on not being conservative, by choosing 16 feet.

Q No --- but you don't have any specific accurate measurement or that there is sandstone at this specific location?

A There is sandstone at this location because we drilled through some of it.

Q How deeply did you drill through it?

A Our holes were up to 10 feet long.

Q So, you don't how much of that 10 feet is sandstone, is that correct?

A Off the top of my head, no. I'd have to go back to my notes to look for each individual hole, what we encountered.

Q And you didn't bring your notes to the courtroom?

A No.

Q Now, let's take a look at shale. What number did you use for the shale?

A What do you mean "What number?"

Q I'm looking at Table 2, under "Sandstone Material," the next one down is shale.

A Right.

Q And is that a clay shale, or what type of shale is it?

A Shale is a form of claystone in any rate.

Q And it doesn't have much of a bearing capacity then?

A Some shales have very high bearing capacity.

Q What kind of shale is this?

A Ones that have a more --- more silty-type particles.

Q So, it doesn't have much bearing capacity, is that correct?

A Some shales have ---

Q The silty --- excuse me. The silty-type, which we're talking about, that's the least bearing capacity, right?

A Compared to what?

Q Compared to the other types of shale that you say have greater bearing capacity.

A Clayshale's probably slightly weaker than silty shale.

Q Is this silty or clay?

A I'd have to ask the geologist that question.

Q You don't know then?

A I don't need to know.

Q Well, you put a factor in for that, is that correct?

A I've represented a geology in my section, that's correct.

Q Okay. What thickness of the shale did you represent?

A I can't recall exactly on this one. Maybe I didn't have the shale on this one. I know there was --- I had a clay --- the claystone is the layer above the --- above the arch. There's a sandstone above it, a sandstone below. It might have been I had a shale in the floor. It might have been I used another claystone. I can't recall.

Q Do you know where the --- do you know whether the shale was in the floor, or at some other part of the structure?

A Without going back and checking the details, I don't know. I'm --- I'm certain that I had claystone above the arch and I had sandstone to the sidewalls and I had sandstone above the claystone.

Q The claystone above the arch is one of the weaker materials, is that correct?

A By comparison with the sandstone, it's weaker, yes.

Q And that --- the area above the arch carries the greatest load, is that correct?

A Not necessarily. It's possible there's a concentration of load in the sidewalls, particularly when it gets down to corners, such as at the footing.

Q But above the arch, the arch, itself, is the point of highest load, is that correct?

A There are high stresses around the arch.

Q And the clay --- clay strata --- claystone strata above the arch, would be the highest stress area, is that correct?

A It's in the zone that is more highly stressed, that's correct. That's what's shown in the results.

Q And you don't know how thick that is, that you put it into this calculation?

A Precisely, no. I think, looking at my figures here, that it was about 5 or 6 feet thick.

Q Well, how can you come to that conclusion?

A Because everything's drawn to scale on these Figures.

Q I see. But you don't --- you don't have any specific reference to that in this calculation, do you?

MR. WALL: Which Table?

MR. SMITH: Table 2.

JUDGE NEMEC: Table 2 --- he's re --- what you're --- what you're missing, I think, Mr. Smith, is that the witness is relating Table 2 to his --- his Figures.

THE WITNESS: I'm looking at Figure 10 here.

JUDGE NEMEC: Yeah, Figure 10, that --- the --- the amounts that he used on --- on Table 2, translated into the various scenarios set forth on Figure 10. And because Figure 10 is to scale, that's how he's able to estimate the thickness of the beds that you're talking about.

MR. SMITH: But Figure 10 presents 10 different possibilities.

JUDGE NEMEC: I understand that.

THE WITNESS: But it is the same geometry on all 10.

BY MR. SMITH:

Q Let me ask you, does Figure 10 present seven different possibilities, as far as clay is concerned?

MR. WALL: Object to the form. "As far as clay's," I don't know what you mean.

BY MR. SMITH:

Q As far as clayrock or clayshale, above the arch, does it actually present 7 different possibilities?

JUDGE NEMEC: Where does the 7 come from? That's what --

MR. SMITH: One, two, three, four, five, six, seven.

JUDGE NEMEC: You mean 7 --- 7 different form --- formulations of the clay rock, itself?

MR. SMITH: The thickness, yes.

MR. WALL: Of the thickness.

THE WITNESS: Oh, it's the first time we talked about thickness. No, it's the same thickness.

BY MR. SMITH:

Q But you don't know where that thickness came from?

A I don't want to be --- put on testimony of saying it's 5 feet, if I go home and find my notes that I used 5 1/2.

Q The one in the center, is yellow the indication of clay? What is the color of clayshale?

MR. WALL: Object to the form of question. There's been testimony that ---

MR. SMITH: Okay. Now ---

MR. WALL: Wait a second, let me finish. That the colors relate to the weight bearing capabilities of this and not the particular element.

MR SMITH: Thank you.

BY MR. SMITH:

Q Now, how can you tell, from this Figure 10, that clay is --- the thickness of clay is indicated?

A Because if you look, this --- look for instance at the one on the bottom, left-hand corner.

Q Uh-huh.

A You can see at the top of that Figure, below the black line, there's a purple line, purple zone.

Q This is the one in the lower, left-hand corner?

A Yes. You see at the top of that Figure, there's a horizontal band of purple.

Q At the top?

A Yes. Alright? And then, all the colors suddenly change.

Q Yes.

A That is where one rock type changes to another.

Q What is the purple rock type?

A That is --- that would have been sandstone.

Q And what is the green rock type?

MR. WALL: Object to the form of the question.

MR. SMITH: Well, the gentleman ---

THE WITNESS: The green is not a rock type.

BY MR. SMITH:

Q Pardon?

A The color isn't a rock type. The color is a representation of the --- the strength relative to the load.

I'm just trying to illustrate to you that there is --- it is not --- that there are some distortions in the colors. The purple changes to other colors, on the horizontal line.

Q But there's nothing on here that indicates one or the other is clayshale-type rock, is that correct?

A I'm telling you that ---

Q I'm talking about the exhibit. There's nothing on the exhibit that indicates it's clayshale-type rock?

A No.

Q And, what you were attempting to do is to interpolate the exhibit, come out with a number, which you used in your analysis on another --- on Figure 2 or ---

JUDGE NEMEC: Mr. Smith, we've gone on and on and on. And you're talking past one another. Do you have any idea how much more examination you have?

MR. SMITH: Well, I'm just pretty much starting, Your Honor.

JUDGE NEMEC: Well, we're --- I'm not --- we're not going to go all night.

MR. SMITH: I don't want to go all night.

JUDGE NEMEC: Well, you --- we've already been going for a --- a good, long time here.

MR. SMITH: Well, I have an ethical obligation to cross-examine this witness.

JUDGE NEMEC: Yes, I understand that.

MR. SMITH: And in addition to that, I have a Constitutional right to cross-examine him on each of the details of his professional opinion. And that's what I'm trying to do, because that's the way ---

JUDGE NEMEC: Well, much of this has been testified to already. And --- and while you may not be happy with what the testimony has been, you know, I have an obligation to the rest of the people in the room, to not let this go on forever.

MR. SMITH: I'll try and abbreviate it as much as I can.

JUDGE NEMEC: Okay. Let's take a five-minute break at this point, for the benefit of the court reporter.

(Off the record.)

(Back on the record.)

BY MR. SMITH:

Q Before we recessed, we were discussing the Table 2. I'll direct your attention to claystone on Table 2. Did you have any specific calculation for claystone, that you worked into these 16 possibilities?

A Could you be more specific what you mean by that? The claystone was part of the model I was analyzing. Its strengths ---

Q If you look at ---

JUDGE NEMEC: Excuse me. I'm going to interrupt both of you. If you look at Table 1, Table 1 contains a bunch of information with regard to sandstone, siltstone, shale,

claystone and concrete. Those were factors that this gentleman considered in his --- his expert testimony, and he has so testified.

Now, with regard to claystone, are we talking about characteristics of claystone, are we talking about depth of claystone, thickness of claystone?

MR. SMITH: Thickness.

JUDGE NEMEC: What are we talking about? You're very unspecific.

MR. SMITH: I thought I said thickness.

JUDGE NEMEC: I didn't hear it.

MR. SMITH: Or claystone as it related to this particular ---

JUDGE NEMEC: Well, if you --- "claystone as related to" doesn't tell us very much.

BY MR. SMITH:

Q Looking at Table 2, where there's a designation of claystone, could you tell us what that represents?

A That represents that --- that one of the materials, included in my model, where the x's are, was claystone. And it's either undisturbed or disturbed, different zones, and I was selecting a high or low, from the high end of the range or the low end of the range, as far as the actual properties are concerned.

Q Well, let's talk about the thickness of the

claystone.

A Okay.

Q What thickness of claystone did you utilize in your calculation?

A I believe 5 or 6 feet.

Q And how did you come to that conclusion?

A By looking at the information that was provided to me from the geology and from the observations that I've made on the --- the portal for that same unit.

Q Is there any specific note or communication which you received, which indicates 5 feet?

A I can't be sure of that.

Q Well then, how do you know that that's where you got your information?

A Because that's what we did. That was part of the work. We did a geologic survey and we did probe hole drilling.

Q When you prepared this Table, did you write down quantifications for each of these --- did you write down a quantification for claystone ---

A That was part ---

Q --- (Continuing) --- in specific numbers?

A That was part of the geometry, in creating this model.

Q The geometry or geology?

A Geometry, insofar as the thickness of the claystone is a geometric measurement.

Q I'll ask you again, did you write down, in the calculation, a specific ---

A Yes, I did.

Q Okay. And do you have the somewhere?

A Yes, I do.

Q Did you bring it today?

A No, I didn't.

Q Do you honestly know what that number is, as shown on that view --- on that report or calculation?

A I believe it's 5 or 6 feet.

Q Do you know? I heard you say you "believe." Do you know, specifically?

A Yes, I know. It was 5 or 6 feet.

Q And you'll bring that in the next time you testify?

JUDGE NEMEC: There may not be a next time, Mr. Smith.

BY MR. SMITH:

Q What other factors did you put in, specifically under claystone?

JUDGE NEMEC: Okay. Let's short circuit this. If --- if --- if you have your notes, would you be willing to provide those --- copies of those notes to the parties and to Mr. Smith?

THE WITNESS: It sounds like he's wanting to know --- see

the printouts of the computer program, that shows the dimensions that I'm using. I can provide that.

JUDGE NEMEC: Would that include the information that you gathered on --- in your notes?

THE WITNESS: It's an assimilation of that information.

JUDGE NEMEC: Okay. And if you had --- if you can find the notes, would you photocopy those and provide those?

THE WITNESS: I can provide those.

JUDGE NEMEC: Is that --- is that acceptable to counsel?

MR. WALL: Yeah, that's --- that's fine, if it'll --- yes, that would be fine.

JUDGE NEMEC: And then, once you have that, if --- if there's questions that arise from that, then you can provide them to me in writing.

MR. SMITH: Your Honor, he said this is an assimilation. We would like to see the data which was assimilated.

JUDGE NEMEC: That's exactly what we're talking about.

MR. SMITH: Oh, that wasn't the way it was phrased, Your Honor. That's why I asked the question.

JUDGE NEMEC: Well, between his notes and the computer printout, you'll have the data.

MR. SMITH: Well, he said that it was --- that the data he used in the computer printout or the program was an assimilation of the other information he received. I would like to see the specific notes which were assimilated.

JUDGE NEMEC: That's what we were talking about, I thought.

MR. SMITH: That's not the way it came out.

JUDGE NEMEC: Okay.

MR. SMITH: Words are pretty important.

JUDGE NEMEC: Yes, they are.

BY MR. SMITH:

Q On Table 1, you have a unit of weight, is that correct, say, for sandstone?

A Yes, that's correct.

Q There's no indication there of the thickness of the sandstone, is there?

A No, there isn't.

Q And, what was the source of the unit weight?

A Published data that I looked up.

Q Now, in the siltstone, you have a unit weight. Do you have any dimension?

A Not in the Table.

Q Do you have it in your notes?

JUDGE NEMEC: Now, hold on a second. Let's --- let's define kN/m^3. Is that a --- a unit of volume?

THE WITNESS: Killinewtons. Kn is Killinewtons. It's like pounds. It's a different unit of force. And M is for meters. It's like feet. Different ---

JUDGE NEMEC: So, it --- it's a weight per volume?

THE WITNESS: Yes, it's a metric weight per volume.

JUDGE NEMEC: Okay.

THE WITNESS: The program that I use is --- like I testified, was developed by the University of Toronto, and it's geared to putting in metric units.

JUDGE NEMEC: So, basically, thickness is not relevant to these factors that are discussed on Table 1?

MR SMITH: Well, it indicates, Your Honor, that there was no calculation as to thickness. That --- basing all this on assumptions ---

JUDGE NEMEC: No. It's a unit --- it's a unit weight of the material.

MR. SMITH: I understand.

JUDGE NEMEC: Okay.

MR. SMITH: I'm just --- I'm bringing to your attention and the attention of the Court, this Table was run, these were the factors, and there is no factor in relation to thickness. It's like a piece of steel. It could be as thin as a can, or it could be as thick as a bridge I-beam.

JUDGE NEMEC: Okay. That --- that's your contention, sir. That's fine.

MR. SMITH: Yes, sir.

JUDGE NEMEC: I understand your contention, okay?

BY MR. SMITH:

Q Does this also apply, and I say "this," I mean, the

methodology also apply to shale and claystone?

A Yes.

MR. WALL: Objection. What methodology? I have no idea what you're talking about.

MR. SMITH: Okay. I'll withdraw the term.

BY MR. SMITH:

Q Does the indication of shale as a material indicate in your calculation of thickness of the shale?

A No.

JUDGE NEMEC: Again, this is in reference to Table 1?

MR. SMITH: Yes.

JUDGE NEMEC: Okay. And in reference to Table 1, does claystone or siltstone or concrete have any relationship to the thickness in the ---

THE WITNESS: I have --- I have not presented any information about thickness on this Table.

JUDGE NEMEC: Thank you.

BY MR. SMITH:

Q As I understand it then, on Table 2, you ran 16 variations, rather than --- because you didn't have a single specific profile to work from, is that correct?

A No. The profile was exactly the same. The geometry was exactly the same. What I --- what was different in each of these 16 runs, was the value of the material properties, the value of the --- specifically the strength.

Q Would you define for us what you mean by "value?"

A Well, in a calculation, you have to input numbers before you press the equal sign, so that values is the numbers you put in before you press the equal sign.

Q Did you have 16 different values?

A There were 16 --- I was using the values that you see on Table 1.

Q Okay. You used the --- do I understand that to be 2. --- 26.1, what is that?

A Killinewtons per cubic meter.

Q Yeah.

A For the sandstone. That was the unit weight I used for the sandstone.

Q Okay. But you had, in addition to that, a dimension, that you ---

A Yes. There's a geometry to the problem.

Q So, you had 16 different geometries?

A No. I --- as I mentioned earlier, it was a single geometry.

Q As the whole, itself?

A The whole and the thickness of the rock units, and their relative positions, relative to the --- to the opening.

Q How did each of these vary in the 16?

A By the value of the material properties that was used in the calculation.

Q So, that's 16 different weights and thicknesses, is that correct?

A No.

Q Bearing capacity, what is the value?

A The unit weight for sandstone didn't vary. The strength --- there's --- you'll see for the disturbed, undisturbed, there's a high --- the series of values represent the high end of the range. So they --- like that MI value, 19 was a --- was a value that I used to represent the high value. The UCS is the unconfined compressive strength. And so, at the high end of the range, I assumed a --- a value of 95 Megapascals. Alright? And so on, across. I used that series of numbers for the --- to represent the high end of the range of material properties for sandstone in the undisturbed state.

Q Where did you calculate the thickness of the sandstone, or where does that go into the formulation?

A It doesn't.

JUDGE NEMEC: The long and short of it is, it doesn't.

THE WITNESS: That's a definition of geometry. You have to define the geometry.

BY MR. SMITH:

Q And how many variations did you use in the geometry?

A One. There's one geometry I looked at.

Q But you have here, on Figure 14, at least four variations, is that correct?

A You've now switched from the integral model to the stand alone model. The stand alone model is one geometry of the arch.

Q Did you utilize these different properties on channel --- on Table 1 and Table 2, in your calculations in relation to Figure 14?

A Yes, we got the same --- used the same data set as input.

Q And how many different results did you get?

A On --- on these ones, we used the --- the test sample concrete strength for the concrete. And we used four different imposed loads on there.

Q And how many results did you come up with?

A Well, there's one, four series of results for the four load cases.

Q You don't know which one actually would be the factual situation that applies in this Case, do you?

A I --- since we saw very little to no debris behind the liner, possibly none of these. These are all way too pessimistic.

Q In other words, the information you had on which you based you judgment was inadequate?

JUDGE NEMEC: That's --- doesn't connect, in terms of a conclusion.

MR. SMITH: My understanding would be, that he just

testified that --- okay. We'll strike that.

Would you read back the ---

JUDGE NEMEC: No. Let's go on.

BY MR. SMITH:

Q Okay.

The stand alone is actually the best representation of what I --- what the actual facts are?

A I don't believe so.

Q Well, you say that you found voids behind the walls.

A Small voids. That's not sufficient to make the freestanding arch the best representation of what's there.

Q You reported on page 5, you say ---

MR. WALL: What are you talking about?

MR. SMITH: On the report.

MR. WALL: Okay. Page 5. What paragraph?

MR. SMITH: Top of the page, second line --- first line.

BY MR. SMITH:

Q "At Station 8+14, beneath SR 2023, we observed what appeared what appeared to be a bedding separation, and debris immediately outside of the lining, particularly on the right side." Can you tell me what a "bedding separation" is?

A It's a --- possibly a small opening in the --- these rocks are all layed down in layers, like a, you know, river stream or a beach or something. They're layed down in layers. And so, each --- each --- between each layer is kind of a

horizontal plane. It's called a bedding plane. Alright? And if one --- if there was to be separation of --- of part of that dropped down and formed a small opening, that's what we'd call a "separation."

Q Which is the bedding? They're in two separate layers? Now, what do you consider to be the bedding?

A The bed --- bedding is ubiquitous throughout the whole ---

JUDGE NEMEC: It's the whole thing.

THE WITNESS: Sequence, yes.

BY MR. SMITH:

Q In other words, the rock in place is the bedding, is that it?

A It's layed down in beds, in layers.

Q Okay.

A Sometimes --- sometime's they're thin, sometimes they're thick.

Q Bedding separation is the separation of layers?

A Of layers of the way the rock was layed down.

Q Yes. Thank you. Okay.

It suggests that the next part of the sentence says, "At both locations," that's two of them, "the variability of materials encountered, and the relatively small thickness of beds of different rock type suggests that the material in the arch of the tunnel is the Quakertown bed between the Upper and

Lower Connoquenessing Sandstone," is that correct?

A Yes, that's what you read.

Q And it indicates that there was debris at two loca -- two locations in this instance, is that correct?

A I have used the plural there.

Q Okay. Now, you told us about bedding above the Tunnel or debris above the Tunnel. Where's the other debris?

A It's --- it's above the Tunnel. That's where we drilled the holes, immediately inside.

Q Would you clarify it for me, both locations, as separate locations?

A We have both locations in the Tunnel. One location is beneath 2023 and the other location is beneath 68.

Q So, you found bedding separation debris at both locations, under both roads?

A We found --- no --- well, the sentence says we found "variability of materials." The bedding separation was in the previous sentence, which I simply observed at 2023.

Q I'm getting a little confused here. Was there debris at each of these locations, under each roadway, or were they both under one roadway?

A I think we found small amounts of debris under both locations.

Q Okay. That's --- by "both locations," you mean underneath the two separate roads?

A Yes.

Q Thank you.

Now, going to the next paragraph, you state that, "The evidence of broken and weathered rock immediately behind the lining suggests that the concrete did not completely fill this void behind the form," is that correct?

A That's what it says. That's correct. That's what is says.

Q So, that's more the characteristic of a stand alone, is that correct?

A No. A stand alone is the entire structure being separated from the rock around it. I'm saying we have isolated places, not in all of the holes. They're in --- in one or --- or other --- you know, we drill 8 holes. We might have found in one or two holes, a small, what appeared to be a --- a separation, or a small amount of debris between the back of the concrete before we went into what we consider the --- the rock. But that doesn't mean to say it's a stand alone. And if --- most of the time, it's in contact with the rock.

Q Do I understand "stand alone" to mean, where the concrete is separated from --- is separate from the rock in place, so that, in effect, the sidewall is standing alone and separate from the rock?

A Right. It is not in contact with the rock around it.

Q Right. And so, what you tell us here, is that the concrete did not completely fill this void behind the form, because there was weathered rock --- broken and weathered rock immediately behind the lining. So, at that specific location, where that hole was or the core was drilled, the concrete was separate from the wall of rock?

A That's correct.

Q Leaving a void?

A There's a small void at that location.

Q And that was --- we don't know if that's the only location, do we?

A No, but we drilled 8 holes, so ---

Q In one line?

A In one line.

Q On each side?

A That's correct.

Q But, in both of these, you found exactly the same thing, that there is a separation or there's broken rock?

JUDGE NEMEC: In each of what things?

MR. SMITH: Pardon me, Your Honor?

JUDGE NEMEC: In each of what things?

MR. SMITH: In each of the two locations ---

JUDGE NEMEC: No, he didn't testify to that.

MR. SMITH: He testified here, Your Honor, that in each of the locations. We just went through that.

JUDGE NEMEC: Well, whatever it is he testified to, it's all in the record.

MR. SMITH: Both locations, in the paragraph up above, "At station 8 14 beneath SR 2023, we observed what --- "

JUDGE NEMEC: Those are two separate sentences, Mr. Smith.

MR. SMITH: Well, I know.

JUDGE NEMEC: And you're trying to read into these two separate sentences, something that's not there.

MR. SMITH: Originally, we went through, in detail, the idea that it implied there was one at each.

JUDGE NEMEC: No, sir, I disagree, but the record will reflect which of ---

MR. SMITH: The record will speak for itself.

JUDGE NEMEC: --- (Continuing) --- which of us is correct, yes, sir.

BY MR. SMITH:

Q Now, if we're talking about one location and debris being behind the wall on each side, is that what we were talking about, or is it --- you said at both locations?

A Could you repeat the question?

Q You testified, or your report says, "There is evidence of broken and weathered rock immediately behind the lining. It suggests that concrete did not completely fill this void behind the form."

A Okay.

Q Now, where did that take place?

A Where did the --- not fill?

Q Yes.

A It would have been ---

Q Yes.

A --- (Continuing) --- odd --- odd spots, isolated spots in the arch, in the roof.

Q Now, you have two ---

A It wouldn't have been in the walls. It wouldn't have been in the walls, because you have a concrete form that you're pouring a wet mixture into, and it would float out and make contact with the walls.

Q Do you have any specific ground for concluding that this was not a stand alone arch or tunnel?

A Do I have any grounds for concluding any ---

Q Specific.

A Because in many of the holes, we went straight from concrete into rock, without seeing a void.

Q This was only --- many of the holes. Now, there were 8 holes in each location, each profile, is that correct?

A Yes.

Q So, at that particular location, you're saying that many of the holes had, and that you went in, from the concrete to the rock, is that correct?

A Alright. Beneath State Route 68, 5 of them went straight into hard sandstone.

Q What is that exhibit number?

A This is Figure Number 6.

Q I notice that at Station 16+40, there is no indication that you drilled any holes in the walls, is that correct?

A That's correct.

Q So, you don't know what was behind the walls, is that correct?

A That's correct.

Q So, you can't tell whether it's concrete up to the stone, or whether it's --- whether there's a void in between, is that correct?

A I didn't drill a hole to make that observation, that's correct.

Q And at Station 8+14, below SR 2026 --- 2023, there was only one core drilled in the sidewall, is that correct?

A That's correct.

Q Can you tell me what that core indicates?

A That we --- that hole, we drilled 6 feet of concrete.

Q And do you know what's on the other side?

A Rock would have been on --- beyond the end of it.

Q No, no, no. The opposite side of the Tunnel.

A On the opposite side of the Tunnel, we see concrete at the surface, but I didn't drill a hole through it.

Q So, you don't know whether not that stands alone or whether it's concrete?

JUDGE NEMEC: Yes, sir, that's true. I mean, you can go --- you can go on forever doing this, and --- and that --- at this point, I think it --- if you want to do that, you can do that in a brief.

Please review your notes, and let's conclude.

MR. SMITH: Okay. Can I have some time to finish up, Your Honor?

JUDGE NEMEC: How much time to you need?

MR. SMITH: I have eight pages of notes, Your Honor.

JUDGE NEMEC: Yeah. I don't know that --- I can't imagine what else you're going to go into, but it's --- so much of it is repetitive, so much of it is argumentative.

MR. SMITH: I'll try and move it as rapidly as I can.

JUDGE NEMEC: I'm going to give you 15 minutes, and --- and at the end of 15 minutes, I'm going to cut you off, and you can take what ever appeals you like, at that point.

BY MR. SMITH:

Q If you have several different scenarios here, do you feel that from those --- I'll withdraw that.

Can you express an opinion, to a reasonable degree of professional certainty, concerning which type of structure

this was, whether it's a stand alone or an integrated ---

A To a reasonable degree of engineering certainty, I think it's a --- integrated --- integral. The concrete's poured up against the rock.

Q Even though there are voids shown?

A Even in the --- in the arch, at the top of the arch, there are small voids shown.

Q You said that all these opinions were based on your --- on the geological information that was furnished to you?

A I used the geologic information to help me define the geometry that I used.

Q I see.

If the geological information were not accurate or in error, would that affect your reasonable degree of certainty?

A I don't believe it would affect my reasonable degree of certainty, because I --- hey, I was out and I saw some of the rock, myself, and, even if I re --- reran these analyses with a slightly different geometry, I'm going to come to the same conclusions.

Q Then why was it necessary for you to obtain a geological study?

A Because that's an important component of the whole process. You need to know which rock units you're in, which rock units you're going through.

Q If these components were in error, would that affect

your reasonable degree of certainty?

MR. WALL: Objection. Asked and answered. I think, verbatim.

MR. SMITH: No, he said, "components."

JUDGE NEMEC: And what did you say?

MR. SMITH: I asked him about the geo--- what I'm asking is whether or not the components he referred to affect his reasonable degree of certainty.

JUDGE NEMEC: I believe he answered that question.

MR. SMITH: It wasn't in that form in the previous question.

BY MR. SMITH:

Q Was there any hydrostatic pressure disclosed at all on this Tunnel?

A In the --- what we encountered hole --- the water inflows beneath State Route 2023, there was a small amount of pressure forcing the water out.

Q You testified concerning the portals. Is it safe --- is it safe for the public to use these portals for access --

MR. PRICE: I'm going to object as being outside of the scope of this hearing.

JUDGE NEMEC: It's not relevant.

MR. SMITH: What I would offer is, that this is a facility which the Public Utility Commission still has

jurisdiction over, and that the safety of facilities, in relation to members of the public, is their first consideration.

JUDGE NEMEC: Do you have --- are you contending that the --- that the route through this Tunnel is a public --- a --- roadway or highway or --- or ---

MR. SMITH: No. What I'm contending, Your Honor, is that this Tunnel was and continues to be a facility of Conrail, that is has not been tran --- it has not ceased to be a facility of Conrail, and as I understand the law to be, a fac --- they have the responsibility for the safety of members of the public, relative to their facilities. In other words, if you had a floor in a station, that had a hole in it, in the station where part of a facility ---

JUDGE NEMEC: Jur --- sir, the jurisdiction of the Commission extends to the inter-relationship between the railroad facility and the public highway. There's two public highways, as I understand it, that cross above this Tunnel. That's the basis of the Commission's jurisdiction. It's so outlined in the Commission's Order and Opinion.

MR. SMITH: Your Honor, I --- as I would understand it, the original Complaint was relative to the safe --- public safety of this facility, as it was being used by members of the public. And that was the original ---

JUDGE NEMEC: That may have been in your --- your

client's Complaint, but the basis of jurisdiction was outlined in my Recommended Decision and the Commission's Decision.

MR. WALL: Thank you, Your Honor.

BY MR. SMITH:

Q In use of computer models, there's an old phrase used among people who run models and run analyses. They use the term "Garbage in, garbage out." Are you familiar with that concept?

A Yes, I am.

Q Does that --- what does that mean, in effect?

A That means your --- the output of the models is dependant on the accuracy of the values that you put in at the beginning.

Q And the results of the different variables, the variations that you have introduced into your model here, the results are dependant on the accuracy of that information, is that correct?

A That's right.

Q And, the accuracy of that information is dependant on the accuracy of the geological information available to you, is that correct?

A That's one of the components.

Q And, since the --- there is not a complete test bore of the whole area, from above the road down, you didn't have the best or most accurate information, is that correct?

A I believe that my --- the information I had was sufficiently accurate to would enable me to provide an opinion with a --- within a reasonable degree of engineering certainty.

Q But the best information would be obtained from utilizing core drillings from the surface to the top, is that correct?

A Not necessarily. As one of the problems with tunneling, is that bore holes give you precise information about one small location, and that's all it gives you.

Q Well, reciprocally then, the bore informa --- the bore information that you obtained, by drilling in two locations in the profile, has the same effect, is that correct? Same logic?

A I --- it's a piece of information. I drilled 8 holes at two --- at each of two locations, so, I did a lot better than drilling one hole from the surface.

Q There was no profile from the Tunnel. That's one location.

A True, but that's what I needed for my model, for my analysis.

Q Now, your load calculations are based on assumptions of the strata and the thickness, is that correct?

A That's correct.

Q And they're not based on specific data, as to the

place in which you drew the --- in which you bored the profiles?

A That's true.

Q This Tunnel was drilled through two different types of rock formations, from one end to the other, is that correct? One 2/3, I think you indicated was sandstone?

A You're talking about the sandstone in the north end. It appears it's in the more the shales and sandstones of the Mauch Chunk.

Q And one of the intersections is above each of these formations?

A The 2023, the Mauch Chunk, is below --- probably well below the invert. At 68, it's possible that it's starting to rise up in the sidewalls.

MR. SMITH: That's all I have, Your Honor.

JUDGE NEMEC: Mr. Price?

MR. PRICE: Just a couple questions.

CROSS-EXAMINATION

BY MR. PRICE:

Q Dr. Elliott, based on your professional opinion as an engineer and the testimony you've given today about the condition of this Tunnel, it's my understanding that inspections of this Tunnel, by whatever responsible party may own the Tunnel, would have absolutely no impact on the safety of the traveling public on the two roads, is that correct?

JUDGE NEMEC: Well, you lost me.

MR. WALL: I was going to say, can you repeat that?

MR. PRICE: I was trying to be quick. I'm sorry.

BY MR. PRICE:

Q You testified that the strata immediately above the Tunnel is ignorant of the existence of the Tunnel.

A At the time you get about 2 or 3 diameters ---

Q 2 or 3 diameters away, which is --- which is a nice way of saying that, if the Tunnel collapses, it's not going to impact that strata?

A That's correct.

Q And likewise, the two roads that exist on the top of the hill, if the Tunnel collapses, are not going to be impacted?

A That's correct.

Q That's the substance of your opinion today?

A That's correct.

Q Would there be any engineering reason to require inspections of the area of the Tunnel below the roads, to determine if the Tunnel was in danger of collapse? Is there any engineering reason to do that, connected with the roadway above?

A Connected with the roadway, no.

Q So, the only reason to conduct those inspections, would be to see whether or not the Tunnel was going to

collapse?

A That's correct.

Q Which would have no impact on the roadways?

A That's correct.

Q Likewise, is there anything anybody could do inside that Tunnel, in the way of an explosion or vandalism or construction activities, that would cause the roadways to collapse or settle?

A I don't believe so.

Q So, again, from an engineering standpoint, there would be no reason to barricade the Tunnel from the Tunnel from the public, to insure the safety of the traveling public on the roadways?

A For the roadways that cross above, no, there's no need to barricade.

MR. PRICE: Thank you.

MR. SHARP: I just have a few, Your Honor.

CROSS-EXAMINATION

BY MR. SHARP:

Q Mr. Elliott, in regard to your hypothesis in Figure 15, I'm not an engineer and I'm asking this to understand. When you talk about the bulking, am I correct in assuming that what you mean is that, when an odd shaped piece of rock or soil formation falls on another one, they're not going to fall down like square blocks, when they fall, there'll be a gap in

between them?

A Correct.

Q So, that means as the --- as this debris would fall out of this hypothetical cone, that it would be filling spaces larger than its actual size, because there are pockets of air left in between them because they're not of uniform shape and size?

A That's correct.

Q Okay. And that's why, at some point, it fills the capacity of the hypothetical hole, to a point where there's no where else to go, because it's not of a uniform shape and size?

A That's correct.

Q Thank you.

I just want to direct you to Figure 6 very quickly. You had stated something on cross that I --- I thought was --- just confused me. Isn't it true that your core bore drillings only revealed a --- a small level of debris, when you drilled on the right-hand side on --- below SR 2023? If I'm looking at the section that's pink ---

A That's where --- that's where there's --- it was sufficient that I could delineate it, that's correct.

Q So, if you found any debris under --- under SR 68, it was of such --- such a small magnitude, that it was hardly worth noting?

A That's right.

Q Okay.

A I wouldn't be able to ---

Q When you talk about the pouring of the concrete, isn't it --- you say that the concrete's integrated, an integrated structure, that poured concrete, with the rock in the Tunnel?

A Yes, they --- they --- I believe they put a form, which is the Tunnel shape we see, and they poured concrete behind it. And it would have flowed until it filled all the --- all the space that it could flow into.

Q And the fact that the concrete varies at different places and --- and has a uniform shape on the inside of the arch, but a very ununiform on the outside, that supports your finding, doesn't it?

A Yes, because the perimeter of the rock would have been uneven.

Q I want to talk about this core drilling. There was a cross about quite a bit of it. It's not --- it wouldn't be prudent for you to go in and drill a thousand core bore holes every five feet or so, would it have been?

A Well, there wouldn't be any rock left if ---

Q In --- would you expect, and there were some questions regarding this, say maybe moving 10 feet out or 15 feet out, from either side of where you drilled core --- bore

samples, underneath the two existing highway rights-of-way, just based on --- on --- would you expect that the conditions to be that close, 10 or 15 feet on either side, to be consistent with the kind of conditions you found when you bored the holes?

A Yes.

Q Okay.

If you moved your hypothetical roadway collapse away from underneath Station 18+4 or 16+40, let's say we move it 50 feet in either way, assuming that you had a chimney that went right up to the sky, if it collapsed and it wasn't under the highway right-of-way, would the rock under the right-of-way collapse?

A I sincerely doubt it.

MR. SHARP: That's all I have, Your Honor, thank you.

JUDGE NEMEC: Okay. Any other questions?

MS. SMITH: I have --- I have a couple questions.

JUDGE NEMEC: Go ahead.

CROSS-EXAMINATION

BY MS. SMITH:

Q In Figure 15, where it --- my reading of this is that, a section 20 feet in width drops down out of a 30-foot width, is that correct?

A Yes, that's the way it's drawn.

Q So, that would be essentially, the wor --- a worse case scenario?

A I believe it is.

Q What would cause something like that? What could possibly cause a tunnel collapse of that magnitude?

A It's --- it would have to --- something would have to go first that would deteriorate the strength of the concrete, itself, for it to fall out. Just as the same, we see the hole at the north portal, that sort of deterioration would have to go and slowly cause the whole of the concrete to deteriorate and, you know, become granular almost, to that extent.

Q In any of the studies that you've done in tunnels, have you ever seen anything like this, where a tunnel's collapsed, inside?

A I have seen collapses in tunnels. Yes, I have.

Q Anything of this magnitude?

A Nothing of this magnitude.

MS. SMITH: I have no other questions.

MR. SALAPA: No questions, Your Honor.

JUDGE NEMEC: Redirect? Any further cross from Mr. Smith?

MR. SMITH: No.

MR WALL: No --- no questions, Your Honor.

JUDGE NEMEC: Now, notes and printout, how soon can you provide those? 30 days?

THE WITNESS: Oh, yes.

JUDGE NEMEC: Okay. You see to it that the parties obtain copies and my --- and myself, also?

MR. WALL: I will do so. Can I ask one question? I've made a submission to everyone, of the report. Was there anybody here present that I didn't include on that service list?

MR. PRICE: It might be helpful, Your Honor, to clean up the service list a little bit. I suspect it has a number of errors on it.

JUDGE NEMEC: Well, we can *do* that.

MR. PRICE: While we're all here.

JUDGE NEMEC: We can do that briefly, when we conclude.

There --- I --- I did get one --- one very vehement request to be removed. I don't even know who --- guess the person got tired of all the notices.

Anyhow, yes, we could do that. We don't need to do that on the record.

MR. PRICE: Okay.

JUDGE NEMEC: Okay. Thank you, sir. You're excused.

(Witness excused.)

MR. WALL: I would move for the admission of Conrail Exhibit Number 1, including all of the Figures thereto and Tables thereto.

JUDGE NEMEC: Okay. It's the Figures 1 through 15 and Tables 1 and 2.

Objections?

(No response.)

JUDGE NEMEC: Without objections, Conrail Exhibit 1 is admitted.

(Whereupon, the documents previously marked as Conrail Exhibit 1 for identification, were received in evidence.)

MR. WALL: Thank you, Your Honor.

JUDGE NEMEC: Conrail have anything further?

MR. WALL: Nothing further, Your Honor.

JUDGE NEMEC: Okay. We have a witness from PennDOT to take.

MR. SMITH: I have one question. It was my recollection, and I may be in error, that at the last hearing we had, there was some discussion of maintaining the safety of the facility, relative to fences and things in that area.

JUDGE NEMEC: Yes, it was.

MR. SMITH: And the present evidence is that this --- fencing, et cetera has been destroyed and people, young children are using it.

JUDGE NEMEC: Well, I haven't heard anything about young children. We've certainly seen the picture of --- that --- that's okay.

MR. SMITH: We have --- I mean, just as ---

MR. PRICE: Your Honor, if I may briefly address that?

JUDGE NEMEC: Go ahead.

MR. PRICE: I did have a witness here. I --- I had to excuse him. Our --- our normal --- Mr. Rupert, who would be our normal witness, is ill today, and he sent one of our other Board members. I had him here earlier today. He would have testified that, due to vandalism, we've been unable, despite our best efforts, to maintain the chain link fence. I do have pictures of the condition of both portals, as of this past weekend. We've spent considerable money to have new blocks placed, but the fence is down. And I do have those pictures available for counsel, if that is an issue today.

MR. SMITH: But I think the public safety, we ought to do something about it.

JUDGE NEMEC: Well, let's address that after we complete the PennDOT witness.

MR. SHARP: I call John Blose.

(Witness sworn.)

Whereupon,

JOHN STANLEY BLOSE

having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. SHARP:

Q Mr. Blose, could you just state your name and spell it for the record?

A My name is John S. --- Stanley Blose, B-l-o-s-e.

Q Mr. Blose, by whom are you employed?

A Pennsylvania Department of Transportation, out of Indiana, Engineering District 10-0.

Q And, in what capacity are you currently employed by the Department?

A I am employed as the Grade Crossing Administrator.

Q How long have you been with the Department, Mr. Blose?

A More than 34 years.

Q How long have been a Grade Crossing Administrator?

A About nine years.

Q Can you just please generally describe your duties as the Grade Crossing Administrator?

A I respect and review railroad crossings and I take notes on that. And what I see, sometimes I'll make recommendations about Does it need replaced? Does it need repairs? I administer the safety --- Railroad Safety Update Program for the District. I attend hearings, I attend meetings in the field concerning railroads and highways, and I guess that's about it. I put together a Safety Program for PennDOT, concerning railroad crossings, about every two years.

Q Okay. Are you authorized to testify on behalf of the Department today?

A Yes, I am.

Q You mentioned before that you inspect and review crossings to determine if they need maintenance or be programmed

for replacement. Could you please go into detail as to what those inspections and reviews entail?

A Well, generally I inspect for safety aspects. It includes checking the riding surface for roughness or potholes. I check site distances for obstructions and that sort of thing. Generally, just take a look at everything, take a ride across it and see how the ride is, whether or not the signs are up and whether the signals operate, whether we have proper painting on the pavement if it needs it.

Q Could you just please briefly describe your educational background?

A I graduated from Punxsutawney Area High School in 1961. I had a year at Clarion State College. After that, I was employed by PennDOT. I went to EIT classes while working for PennDOT in the evenings, and with the appropriate application, the education and the experience, I went and took the EIT examination and did subsequently pass it.

Q An EIT, just for the Court's edification, that is ---

A Engineer and Training.

Q And --- but you're not a Professional Engineer, license by the State?

A No, I'm not.

Q Okay. I just wanted to make that clear on the record. What other positions have you held with the Department?

A When I originally was employed by PennDOT, I started

out as a Engineering Assistant, constructing or --- well, working as an inspector, while they were constructing highways, bridges and that sort of thing. And from there, I moved up to Construction Inspector 1, 2, 3. And then, after I got in --- lucky enough to get in the CE Engineering Program, I've gotten promotions in the area to Civil Engineer 2, Civil Engineer 3 and presently, I'm a Senior Civil Engineer for Highways.

Q And when you use that designation, that's a Department that ---

A That's a Department designation.

Q Thank --- thank you.

How long --- you mentioned that you did inspection. How long were you a --- in the bridge or structure inspection?

A Approximately, 10 years.

Q What did you do in that Job? What type of structures would you normally inspect during that --- in that job?

A Well, all types of structures: steel, concrete, overhead bridges, railroad bridges, culverts, just about everything.

Q Can you just generally describe your duties in doing that as a Bridge Inspector?

A What we do is --- well, to start off with, I had to be certified to do this after a bit. I went to schooling for about three weeks for it. It was intensive training. And after that then, we would --- we were provided forms that we filled out,

and what it did was, we rated the conditions of the structures, every element that we could see or look at, and then from that, we used those conditions plus the various aspects of the clearances to rate a structure.

Q Okay. Now, in doing that, in your duties as a Bridge Inspector, would that give rise to any review of drainage systems and structures?

A Yes, it does.

Q Could you elaborate?

A Many times, waters that are common to everybody that has problems with it, with bridges, gets into places where we don't expect it: maybe behind abutments, or in pipes or culverts that don't work properly. We've got to figure out how it got there, what caused it and how to remediate it. And lots of times there's cracks in concrete, and it's aggravated by water getting into that. The freeze-thaw cycle deteriorates the materials. And, as a result, the condition of the structure slowly deteriorates.

Q Okay. And in your experience as a Construction Inspector for the first nine or 10 years, did that give rise to any involvement with drainage or drainage systems?

A Yes, it did.

Q Could you elaborate on that?

A As part of what I did out there as an Inspector, many times it was to be Inspector while they were installing a pipe

installation. I also did bridge inspections while I was on that, while they were building them. So, I have a lot of experience in the area where in comes around about with drainage and water courses and so forth.

Q If you had to estimate between bridge and roadway construction projects, how many instances have you either inspected specific a type of drainage element in either a roadway construction or a structure in a construction job?

A Oh, many times, for both applications.

Q Okay.

A Many times.

Q Over 50?

A Yes.

Q Okay. Over maybe 100?

A At least that.

Q Okay. You've described --- you described the training and courses that you've taken for those Inspector positions. Prior to this present Case, have you ever surveyed lands or roadways in connection with drainage problems, before this particular report?

A Well, as part of the training I had with my EIT and subsequently getting hired as a Civil Engineer, I went through a training program, and we went out in the --- several locations and took a look at drainage, what was there, what maybe it needed, and made recommendations about that, as far as the

design for upgrading the highway section. And mostly it was for highways.

MR. SHARP: Your Honor, at this point, just so I clear this up now, I'm going to offer Mr. Blose. And again, I want to note that know he's not PE under the register or anything. I'm going to offer him as expert in drainage. And he's the Department's witness in this matter. I'm assuming I'll have to leave him open for cross on that issue now, based upon his experience and training.

JUDGE NEMEC: Any questions?

MR. SMITH: No, Your Honor.

MR. PRICE: No, Your Honor.

MR. WALL: No, Your Honor.

MS. SMITH: No, Your Honor.

MR. SALAPA: No, Your Honor.

MR. SHARP: Thank you, Your Honor.

BY MR. SHARP:

Q As a result of the --- I'm sorry.

Mr. Blose, as a result of the Commission Order, dated September 5, 2000, did the Department undertake a study of the highway drainage elements of State Route 68 where the highway travels above the entrance of East Brady, including, also the sluice?

A Yes. The Department was directed to provide information concerning alleged drainage from the highways that

may affect that north portal.

Q Who performed this study?

A I did that study.

Q Okay. I want to show you what's been previously identified. Do you have a copy in front of you, what's been previously identified as the written report of the Department of Transportation regarding its investigation of the drainage issue at the north portal of the East Brady Tunnel? Are you familiar with this document?

A Yes, I am.

Q Okay. Who prepared this document?

A I did prepare this document.

Q Okay. What does this document contain?

A Well basically, it was a combination of review of plans when the highway was constructed, and then going out in the field and reviewing those plans, those locations for the drainage concerning this project and this particular location.

MR. SHARP: Can I just hold for one second? Does anyone require another copy of the report that was previously submitted?

MR. SMITH: No.

MR. SHARP: Your Honor, do you require another copy?

JUDGE NEMEC: No.

MR. SHARP: Okay.

MR. PRICE: I could use a copy, if you had it.

MR. SHARP: Would you like me to mark it as an exhibit, Your Honor? I ---

JUDGE NEMEC: Yes.

MR. SHARP: Okay.

JUDGE NEMEC: You already have PennDOT 1 and 2 in the record.

MR. SHARP: Is this filed 2 or this is 3?

JUDGE NEMEC: You filed 2. Your next exhibit number would be 3.

MR. SHARP: Thank you, Your Honor. We'll refer it as DOT 3, and that would be the entire package of the exhibit.

JUDGE NEMEC: And that consists of a, looks like a four-page report and then a list of photo descriptions and a pack of 12 wonderful photographs, followed by a set of drawings.

MR. SHARP: That's correct, Your Honor. Actually, I'll have Mr. Blose walk through that very quickly.

(Whereupon, the documents, photographs and drawings were marked as PennDOT Exhibit 3 for identification.)

BY MR. SHARP:

Q Mr. Blose, the three documents that are part of Department Exhibit 3, what are those three things, very quickly, the first one being five pages in length.

A Okay. The one that's five pages in length is a document indicating that I did traverse down over this area and

took a look at what was on the hillside and down over to the drainage area where the half pipe and so forth were put in by probably the railroad. And as I did this, I also took photographs. And I have a description of those photographs, also.

Q And that --- that is the --- that's another three-page document that's attached?

A Right. And then there's another three-page document that indicates the review of the drainage.

Q Okay. Just very briefly ---

JUDGE NEMEC: Hold on a second.

MR. SHARP: Yes.

JUDGE NEMEC: What's the five page?

MS. SMITH: Yes, what's that?

MR. SHARP: Hold on a second here, Your Honor.

JUDGE NEMEC: Because I may not have that. Let me see what your calling five page. It is a four-page document, that begins "A review of construction changes that was made on the following roadway." And then I have the three-page photo shoot description ---

MR. SHARP: But you do not have ---

JUDGE NEMEC: --- (Continuing) --- the photos and then the maps, but I don't have the five-page narrative.

MR. SALAPA: Neither do I.

MS. SMITH: No, I don't have these narratives.

MR. SHARP: No one has this?

MS. SMITH: These narratives.

MR. SHARP: I know that when these were originally sent out, I know that --- Ms. D'Alfonso had sent out two letters.

MS. SMITH: The one that was sent out last, is the three-page one.

MR. SALAPA: Yes.

MS. SMITH: That begins with the review of construction plans.

MR. SALAPA: And then the other one is the photo description.

MS. SMITH: And ends with your signature, John Blose's. I don't know what the five-page one is.

MR. SHARP: I do have copies of that. Let me ---

(Off the record.)

(On the record.)

JUDGE NEMEC: PennDOT Exhibit 3 then consists of a five-page narrative, a further three-page --- four-page description of the ---

MS. SMITH: Where do you get four pages? I only have three.

JUDGE NEMEC: It says three. I'm sorry.

MR. SHARP: That may be a duplicate page.

JUDGE NEMEC: The first page is a duplicate of the second page.

MS. SMITH: That's where it went.

JUDGE NEMEC: We're going to start over again.

PennDOT Exhibit 3 consist of five-page narrative, three-page description of the construction plans, a three-page description of a photo shoot with 12 photographs and a set of highway drawings.

MR. SHARP: Thank you, Your Honor.

BY MR. SHARP:

Q Mr. Blose, I actually --- let me work backwards very quickly. I want to direct you to what the Judge just identified as a description of photographs. With these photographs --- and they correspond to a series of 12 color photographs in the package, is that correct?

A That's correct.

Q Okay. Who took these photographs?

A I took these photographs.

Q When did you take these photographs?

A Well, there's two different dates that they were taken. The one with the view out over the overlook was taken in March of '99.

Q And which photo number was that, Mr. Blose?

A Photo Number 1. And the rest then were taken on December 1, 2000.

Q These photographs that you took, do they accurately depict the conditions at the crossing site at the time you took

them?

A At the time, yes.

Q Okay. And what is the three-page document that references each photograph?

A That's simply a description of what's in view on the photograph.

Q Okay. And there are corresponding numbers on each photo to the --- to that document?

A That is correct.

Q Okay. Mr. Blose, I also want to direct you to what's been described as a three-page document, which you and I have referred to it as the drainage study --- I'm sorry, not the drainage study, review of construction plans. Could you just please give me a general overview of what's contained in that three-page report?

A It's a description of viewing the plans. When this highway was built, there was a set of plans made for it. Then I was out and I did a field view to verify what I was seeing on the plans.

Q Okay. And, could you just generally give me a summary of the findings that you made, in relation to viewing the roadway in conjunction with both your site view and the plans?

A Basically, it was a conclusion that I came to is that, very little, if any drainage comes off of the highway toward the tunnel area. It all drains away from it.

Q Can you explain ---

A It drains to the south, rather than to the north.

Q. Okay. Could you explain some of the reasons why that is and just summarizing what's in your report?

A Basically, this road was rebuilt in areas where the old road was. They put parallel ditches in, water drains down to the low point, and then they took it across underneath the new roadway, away from that location. In the other areas, further to the north and to the east, the highway curbs away from the location --- away from the Tunnel location. And as it does that, it's on a super elevation, so ---

Q Could you explain that just very quickly for the Court?

A Okay. So, when you go around the turn, you lift the one side of your pavement, so you can make the turn, so you don't run straight rather than --- you call it super elevation. That keeps your car on the highway. Basically what it does, is all the drainage goes away from that high point to the low point, and the low point is the side away from the Tunnel area on the north portal. There's also drainage structures put in there, inlets and a swail area ditch. If there's any drainage that comes off of the roadway, the shoulder could do that. The cut slope could also do it, but it's not a whole lot. But it's picked up in these inlets and then it's taken across to the other side of the road, in pipes and then carried away in storm

sewers.

Q Okay. And when you're looking at this, your report, in conjunction with the plans, about what length of roadway did you look at? You looked at stations. What was the length you looked at?

A Oh, I'd say about --- probably about 2000 feet.

Q And this was the area that was --- this 2000 feet was over --- generally over where the Tunnel --- would the Tunnel be about the center of that?

A Somewhere near that. The lookout area was the first area that could have affected any flow to the --- toward the Tunnel. And there's a marker up by one of the inlets, on top for SR68, that indicates that the Tunnel is directly below that. So, I knew from that, basically where my orientation would be for the drainage study.

Q Okay. And just for clarification for someone looking at your report, you actually --- you note stations. What do those station numbers in your report correlate to, as far as the rest of the package?

A What they correlate to is the actual highway construction plan sheets that --- that's also included. And it goes from Station 157+66. And basically, that one's also in quality. So, it equals another Station. I put that in the notes and I forgot about it and I went back and reviewed it. And so, all of a sudden, "Wait, something's wrong." And then I

saw the equality. So, it's okay. And it goes up to 177+89, which is basically beyond --- way beyond any point that would cause drainage to come back toward the Tunnel.

Q Okay. Mr. Blose, I want you to turn to --- I just --- one conclusion you drew there, you said that --- you note on page two that --- of that particular study relating to the highway, at the bottom of that page, that you stated that, "Looking at the information, the plans, that no drainage was designed to exit to the north side of the highway." How does what was designed conform to the as-built condition, at the site you visited?

A To this point, it's relatively the same. However, at this one location, 174+ is about where there's a driveway that was built in --- a new residence was built there and so forth. The plan, the highway construction plan had called for a small ditch to pick up the drainage off the end of the cut and take it down into a natural drainage away from the area that would go toward the Tunnel. And since they put a driveway pipe in there, also, I expect that most of the drainage still does flow away from this.

Q Would the driveway pipe --- what does that take the place of, in a normal drainage system on the side of the highway?

A In this particular case, it would have taken the place of a small, what we call a "tail ditch" or a small parallel

ditch.

Q Okay.

A It simply put a pipe in the area.

Q Mr. Blose, I just --- I want you to turn now to what was just distributed to the parties as the five-page narrative report of your visit on December 1st of 2000. Could you please briefly summarize the nature of your visit, what you looked at and the conclusions you reach, as a result of the Commission's direction that you look at the sluice?

A Okay. I went out there basically to check out the --- the drainage situation and verify it. And I thought, "Well, I have time enough, I can go take a look at some of the other things." And so, I got up there and I figured, you know, "This is a good place as any to go down over the mountain."

So, I started down over and there was a small road where they had done some logging. And I walked down over that and circled out around the hill, down over the hill some and somewhat to the north and to the east a little bit.

Q And when you are saying, "to the north and east," north and east, as in reference to?

A The highway, itself.

Q Okay.

A A little bit, and also in reference to --- to where the Tunnel is.

Q Okay.

A I'm still very high on the hill above it. And then I walked down that logging road as far as it would go and then started down over the slope, at a gully. And there was two, small gullies there. And it was very steep, but I got to the bottom. Occasionally, I'd slide and so forth, but always would get stopped. And there was, December 1st, a little bit of snow there, not much, but a little bit.

And as I moved down over the hill, then I moved a sort of away from these two gullies and down on to a much flatter area. And in this area you could see some old evidence that there had been some kind of mining, coal mining: There was coal lumps there, there was small pieces of shale, indicators that at some point, somebody had mined some coal from this area.

And then I went on down and I came to these drainage sluices. And what it consisted of was a metal pipe, like it was cut in half and placed down in the drainage area to pick up water that was coming down from these gullies, take it away from the top of the Tunnel and to flow down over the embankment toward the river. At that time there was no drainage that I could see was flowing in that particular location.

Q What was the condition of the sluice?

A Mostly full of leaves, gravel and that sort of thing. It was nearly full. And I would presume that at some point there had been heavy rains or floods or something, and I even thought that maybe back as far as the East Brady Flood,

something like that had happened. And that had been several years before that.

Q Now, you referred to in your report "the top sluice and the bottom sluice." Can you just describe what you observed there and what the difference is?

A Okay. Where the bottom sluice matched up into the hillside, there was cribbing belt, like 6X8 wooden ties. They looked like railroad ties to me. But they were pretty well covered up, so I couldn't be sure. But they built a little embankment, and then the pipe fit over top of this into one of the areas and then they filled in around that a little bit with material, to pick up the drainage so it would go across the Tunnel.

Q So, on ---

A And that was the lower one.

The upper one was quite a bit longer, filled up just about as much as the bottom one was. It came up to an area where they had cribbing, also, as a retainer, to hold some water, so it would build up and then flow in through the half pipe. Because the pipe was full of debris, also, the drainage was not getting into the pipe. It was coming and flowing down along it and down under it. And there was also a deadfall there, it had --- a tree had fallen down on it at some point, bent it over somewhat and depressed it. So, even if there was water in it, it probably wouldn't have flowed.

Q Let me stop you there. So, is the purpose of Sluice 1 to bring water down to the collection area that then goes down Sluice 2, if it were working properly?

A No. There were two separate --- two separate areas. Probably to take care of some of the same drainage that may have escaped the upper one. But, I guess they felt they needed another way, because the bottom sluice was further down on the hill and easily could have picked up more drainage that came out of the rock structure.

Q Okay. The Commission had asked for some basic findings. Other than your conclusion on page 4, you make a conclusion that the work was done at the direction of the railroad because of the nature of the facility. Does the Department, do we have any information, at all, as to absolutely who constructed this sluice?

A Unfortunately, no, we don't have any information, at all. It's a type of pipe that would be available by anyone to build something like this. In fact, I tried to contact some people who worked at Conrail or Pennsylvania Railroad Company and see if they knew anything. And the one gentleman I talked to had been an engineer conductor, and he said ---

MR. WALL: I'll object. I think you're going into hearsay.

THE WITNESS: Okay. It ---

MR. SHARP: Why don't you wait, John, and let the Judge rule on the objection.

THE WITNESS: But I couldn't find out any information.

BY MR. SHARP:

Q That's okay. Let me ask --- that's okay.

And, as a result of your investigation, you could not determine who constructed it?

A That's correct.

Q Okay. Just --- because the Commission asked, just could you please just describe your recommendations there on four and five, as to what would need to be done to repair this --- these sluice devices?

A Well, basically, the first thing that needs to be done is for them to be cleaned out, relined, leveled up, extended. And it costs some bucks to do that, there's no doubt. My estimate here was something over $10,000 to do all of the work.

Basically, the area where the hole is in the top of the Tunnel arch would have to be somehow bridged and strengthened, so that water wouldn't just go through the bottom of the pipe and into the Tunnel, and it would take some bigger wood members there to be able to span that properly.

Q Okay. Have you been back to this site, subsequent to your visit in December?

A Yes. As a matter of fact, I was back early in May. I'm not sure of the exact date now. It's probably on those photos there (indicating).

Q Okay.

A In fact, Mr. Hull and I traversed to that area on bicycles, to take a look at the location.

Q Okay. Can you generally describe what you did on your second visit, on the main visit?

A Well, I took some more photographs. And, indeed, the photographs do show that the trail people did, in fact, put large concrete blocks in front of both openings, higher than they had been.

Q John, if you can hold on a second.

MR. SHARP: Your Honor, can I just present what's been marked as Department Exhibits 4 and 5?

JUDGE NEMEC: Does everyone have Department 4 and 5?

MR. SMITH: Yes.

(Whereupon, the photographs were marked as PennDOT Exhibits 4 and 5 for identification.)

BY MR. SHARP:

Q Mr. Blose, are these (indicating) the photographs you were just referring to?

A Yes, they are.

Q Okay. Can you please generally --- did you take these photographs (indicating)?

A I did, yes.

Q Okay. Do these photographs accurately depict the conditions at the north and south portals of the crossing, at

the time you took them?

A Yes, they do.

Q Could you please just generally go over these photographs in Department 4 and 5?

A On the --- on Number 4, there's three photographs there of the north portal. And basically what it shows there (indicating), is that there are more blocks there than had been before.

Q And on Department Exhibit 5, what does that depict?

A Number 5 depicts the south portal. It shows, there again, that someone has placed large blocks to block off the entrance.

Then there's this --- the middle picture there shows the wooden sluice that has been referred to by other witnesses.

And the bottom the picture is a photograph from inside the tunnel to the outside of the tunnel. And you can see some of the rock slope, on the left-hand side.

Q John, I think --- I'm sorry. That's right. That's right. That's --- I'm sorry. That's correct. I'm looking at the wrong photograph. You're correct, John.

Can you just generally describe some of the findings that you made when you were there, if there were differences in the conditions at the crossing from when you were there on December 12, in relation to anything that you observed?

A Basically the photos here (indicating) indicate that

there were large blocks put in place. However, there were some other things that had happened, too. Sometime previous to when we visited there, this past time, there had been again some heavy rains. The photos that I had taken last December, it looks like a real torrent came down in some of those gullies, washed out leaves and so forth and even washed some of the debris out of some of --- one of the pipes, the lower pipe. And there was actually some water flowing across that Tunnel, on that pipe. But there were many holes rusted in the bottom of the pipe. So actually, most of the water was falling out of that sluice, down toward the Tunnel, where the hole was in the Tunnel.

Q And you're referring to the sluice on the northern portal?

A That's correct.

Q Okay.

A That's correct, northern portal.

MR. SHARP: I just want to distribute what's been marked as Department 6.

(Whereupon, the photographs were marked as PennDOT Exhibit 6 for identification.)

BY MR. SHARP:

Q John could please just generally describe what Department 6 Exhibit is?

A It's photos of, again, the south portal area. The top one, again shows that sluice coming off of the embankment above the Tunnel. And it's very close to the edge of the Tunnel, itself, where it comes down. And if you look closely you can see it looks like wet --- the rocks underneath it are wet. There was a lot of water flow coming either around that sluice or in holes in the bottom of it because they were rotted. The planks on the bottom of the sluice were rotted here and there.

Q And again, John, did you take these photographs (indicating)?

A Yes, I did.

Q Do these photographs (indicating) accurately depict the conditions at the south portal when you viewed them?

A Yes, they do.

Q Okay. Just could you describe the other --- the bottom photograph?

A Okay. The bottom photo is closer out to where the Tunnel curved away and then was constructed into the hillside. And it actually shows here (indicating) some blocks further away from the location. You can --- and then, in the background, you can see the blocks that are closer to the Tunnel.

MR. SHARP: Your Honor, that's all I have. I would offer Mr. Blose for cross and I would move Department 3, 4, 5, 6, subject to cross.

JUDGE NEMEC: Subject to cross-examination and later motion

or objection of the parties, PennDOT Exhibits 3, 4, 5, 6 are admitted into the record.

(Whereupon, the items previously marked as PennDOT Exhibits 3, 4 5 and 6 for identification, were received in evidence.)

Any questions?

MR. SMITH: I do, Your Honor.

CROSS-EXAMINATION

BY MR. SMITH:

Q Mr. Blose, do you have a Photograph Number 7?

A Yes, I do.

Q Could you tell me what your description of that is in your statement or summary?

A I have here a photo of cut at north portal. It shows a coal seam structure of the mountain above the Tunnel, along the cut of the railroad.

Q Now, that's the coal cut there shown between these two layers of hard stone?

A Yes.

Q How high would that coal be? How thick would that coal be, from your observation?

A From my observation, somewhere less than two feet, I would estimate.

Q Just a perception of mine, looks like it's --- in the

photograph, it looks rather thick. That's why I'm asking. Couldn't be 4 or 6, would it --- could it?

A No. No, it's not. It definitely is not.

Q I'm looking at that tree in the foreground there.

A The tree's very close to the location where the picture was taken from.

Q I see.

And now, what was the area that you indicate that had been mining activity?

A Photograph Number 5. In my photo, I can't see anything specific that indicates that right now, but, that is where the area, though, near the --- about three-quarters of the way up, there's a dark spot, and that was a stump that was in the gully, itself. And most of what I saw was to the right of that. And that would have been to the west.

Q Well, what did you actually see, in terms of activity?

A What I saw was old coal lumps, and you could see that they had been coal. I mean, they were weathered. Some of them were weathered quite a bit. You could hardly tell that they were coal, but they were. There were some shales that had weathered out, also, in this same area.

Q I see. And that Photo 7, it says here, "Photo of cut at north portal shows a coal seam in structure of mountain above tunnel." What do you mean by "above tunnel?"

A In elevation.

Q In elevation.

A In elevation.

MR. SMITH: That's all.

Oh, one other thing.

BY MR. SMITH:

Q You showed us pictures of these blocks. On D-4, it appears to me that somebody can readily walk right around the left end of that. Does that ---

A That's not so. That's not so.

Q There's a little embankment ---

A Well, it's --- it's probably about four or five feet high at that point, so, you can --- you can walk up over, I admit, but it's not easily done.

Q Well, as I see the bank there, there's --- it covers part of one corner. I'm looking at D-4, the top picture and I'm looking at --- there's only one block showing above the level of this little embankment there. It looks like anybody could walk up there and around. Is that --- somebody would reasonably walk up and around that?

A No.

Q You don't think so?

A No, I don't think so.

Q Now, there's a photograph ---

A We had difficulty getting beyond this point to get inside that area. It was not easy to do.

Q Now, take a look at D5, bottom. There is a gentleman standing in front of a rock. Do you see him?

A I see a silhouette, yes.

Q A silhouette. And you can see how high his crotch is, which is above the level of the first level of stones, is that correct?

A He's standing on another one or two layers of stone there, also.

Q It looks to me like someone can climb through those notches. That seem reasonable to you?

A It can be done. It's --- I --- I assure you, though, sir, it's not easy.

Q And I see the --- this little pole to the right of this gentleman, in the area covering from his knees to his crotch. Looks to me like a kid could crawl through there. Is that about right?

A From that point, the one --- the notch there between the rocks on the top, no, not easily.

Q Do you have any children?

A Yes, I do.

MR. SHARP: Objection, Your Honor. The question's irrelevant.

THE WITNESS: And the reason, sir, is ---

MR. SHARP: Again, John, let the Judge rule.

JUDGE NEMEC: Overruled. Go ahead. Answer.

THE WITNESS: They would have to have a ladder to get up that high.

BY MR. SMITH:

Q Well, as I see it, there's only four layers of --- three layers of new stone, is that correct?

A That's correct, and then they are sitting on another layer of --- the one's on top are concrete and the ones on the bottom are rock. They're large building stones or some sort of large stone. I assure you it's not easy getting up over this.

Q I'll let the photos speak for themselves, but it appears to me, from examination of the photos, that a normal child can climb right through them. I had seven of them that could do it.

A That's your opinion, sir, and you're entitled to it.

JUDGE NEMEC: Any other questions for this witness?

MR. SMITH: That's all I have.

MR. PRICE: I have just a couple questions.

JUDGE NEMEC: Go ahead.

CROSS-EXAMINATION

BY MR. PRICE:

Q Mr. Blose, did you observe the condition of the fence, when you visited the site in May?

A Yes, I did.

Q What were your observation of the fence?

A On the north portal, the gates down in the side to the

right as you're looking into the Tunnel are down. There's still fencing on the left side that's up and in place.

Q So, it's partially disassembled?

A That's correct, it is.

Q Does the disassembly of the fence appear to be consistent with vandalism?

A My personal opinion, yes.

Q How about the other portal?

A It's even worse yet. Some of the --- some of the support posts were even dragged out of the area. As I recall correctly, there may only be one post that's still standing, and the fencing's all down.

Q Now, Mr. Blose, did you observe any other chute or structure on the south portal, other than the one that's identified in your pictures?

A No, I did --- no. I can't identify anymore than that, no.

Q In your opinion as an engineer, is the chute that's shown in your pictures of the south portal, for the purpose of walter drainage, as opposed to a coal chute of some sort?

MR. SHARP: I --- Your Honor, I'd have to object, only to the extent that Mr. Blose is qualified as an expert in drainage. I just want to make sure I keep that clear on the record. And you asked for his expert opinion as an engineer.

BY MR. PRICE:

Q That appears to be a drainage chute, as opposed to a coal chute?

A From what I saw there, there was water flowing down this chute. Some was coming off the end that --- at the end of this fixture. Most of it was flowing through holes that were in the planks and not getting near this direction.

Q I'm asking you for your opinion for its original purpose as a structure.

A I simply don't know. It could have been either way, and I don't know. I'm sure that coal could have been --- come down across this as a way of getting into the railroad. I don't know that to be so, though. That's only speculation.

Q Do you know what the bottom terminus of the chute would have been?

A There was a structure of some kind there. I don't know what it was.

Q One more question. The north portal, the mining activity you observed, how far up the hillside was it or down, whatever's easier for you to describe?

A It was well above the Tunnel, probably 200 yards in, like if you traverse it, if you walked it. Elevationwise, probably 50 feet, 75 feet even.

Q Thank you.

A Maybe even more than that, but it was quite a ways above it.

MR. PRICE: That's all I have.

JUDGE NEMEC: Okay. Any other questions?

MR. SMITH: I have just two questions for him.

RECROSS-EXAMINATION

BY MR. SMITH:

Q Did you walk through the Tunnel, Mr. Blose?

A In this path --- I have walked ---

Q *On* this occasion, did you walk ---

A No, I did not.

Q Why not?

A I was on a bicycle, and we couldn't get it through the stones.

Q Alright.

Now, Mr. Price mentioned vandals and vandalism. Is this Tunnel in its present circumstances vandalproof?

A Nothing's vandalproof, sir.

Q Well, if it were cemented up with concrete block, it be vandalproof wouldn't it?

A Then you'd probably ---

MR. SHARP: Objection, speculative.

JUDGE NEMEC: Sustained.

MR. SMITH: That's all.

JUDGE NEMEC: Alright.

The hole in this Tunnel is in the northern portal?

THE WITNESS: Yes.

JUDGE NEMEC: The drainage sluice, though, is at the south portal?

THE WITNESS: The --- there's one at the south portal and I guess it's a drainage sluice. I don't know for sure.

JUDGE NEMEC: You don't know what it is?

THE WITNESS: I'm not sure what it is.

JUDGE NEMEC: But there's also one at the north portal?

THE WITNESS: There's actually two drainage structures, sluices, to direct water away from the area that could float toward the Tunnel, itself.

JUDGE NEMEC: Alright.

And the contention with regard to whether it was used for coal or whatever, has to do with the one at the south portal?

THE WITNESS: That's correct.

JUDGE NEMEC: Alright. Because I don't recall anything about a drainage sluice at the south portal, from the first hearing, and that was my concern.

Okay.

MR. SHARP: I have no redirect, Your Honor.

JUDGE NEMEC: Okay. Thank you, sir.

(Witness excused.)

MR. SALAPA: I call Mr. Hull.

(Witness sworn.)

Whereupon,

RONALD J. HULL

having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. SALAPA:

Q Could you please state your name for the record?

A Yes. My name is Ronald J. Hull.

Q And Mr. Hull, by whom are you employed?

A I'm employed by Pennsylvania Public Utility Commission and the Bureau of Transportation and Safety, Rail Safety Division.

Q And how are you employed, Mr. Hull?

A I'm a Civil Engineer, employed the Bureau.

Q How long have you've been employed by the Bureau of Transportation and Safety and the Public Utility Commission?

A Over 13 years.

Q And, what are your duties as an Engineer with Commission?

A My duties are basically that I'm assigned Cases dealing with the public, highway-rail crossings, to in the amount of the cases, you know, staff positions as far as enhancing public safety at these crossings, testifying in --- at hearings such as this.

Q And, are you authorized to testify today on behalf of the Bureau of Transportation and Safety?

A Yes, I am.

Q And, are you a Licensed Professional Engineer in the

Commonwealth of Pennsylvania?

A Yes, I am.

Q And, are familiar with the crossing that is the subject of this proceeding?

A Yes, I am.

Q Mr. Hull, when was the last time that you visited this particular crossing?

A Well, as the previous testimony, Mr. Blose with PennDOT and myself visited the crossing on May 9 of 2001.

Q And, when you visited the crossing, did you visually inspect the crossing?

A Yes, I did. However, since I did not have a lift, I could not closely inspect the roof of the Tunnel. I did not inspect the entire Tunnel because I didn't have adequate lighting. So, I was only able to observe the areas around the north and south portal.

Q Okay. And what did you observe during your visit?

A As previous testimony, of course, the chain link fence on both the north and south portals was removed and probably vandalized. However, I did notice new concrete blocks. They were approximately stacked eight feet high, and they were placed in front of both portals. And these were pre-cast blocks of tongue and groove to deter movement.

The roof section immediately adjacent to the north portal showed excessive water coming through and new sections of the

roof appeared collapsed in this area.

As Mr. Blose testified, then we walked above that portal and inspected this water collective system, which I classify as a half-size metal corrugated pipe, which there was two sections of it which existed above the portal, which of course, obviously, was designed to remove this surface water away from the portal area. However, the system is inoperative due to there is excessive buildup of debris.

Some of it there was extreme section loss. In fact, it was actually rusted through. And actually, there was a lack of a catch area on the uphill side of the pipe, so, the pipe was allowing a lot of the water to go underneath there, go through it and then into the roof of the Tunnel. It was only a trickle that was actually working its way down the pipe.

Q With regard to the roof of the Tunnel, you said it appeared as though there was additional damage there. Was there additional debris on the Tunnel floor?

A Yes. It was just like surface runoff material, sediments, not like large pieces of the rock, but, you know, surface runoff of, you know, silt-type material buildup. There was pretty excessive water coming through the roof right there, and I can't say for that area. I know in Harrisburg, it was pretty dry about three weeks prior than that. We had a very dry month of April, so, it was --- I don't know this area, whether they had rain right before that, but it was pretty dry in the

Harrisburg area before I visited it.

Q Is there any method, in your experience, that could be used to secure the fencing or secure the portals at both ends of the Tunnel, to keep people out and to keep the fencing, itself, from being vandalized?

A Well, I thought the additional concrete blocks that were placed in front of both portals would help deter any vehicles getting access to the fence. However, I gained access by crawling between the blocks, so, I felt if more blocks are added and butted up against one another, that would prevent someone even like myself from crawling through, where I'd maybe need a ladder or something to climb over the wall, because that's how I got through. I just climbed between the blocks at the south portal.

The north one, there was gaps in between, I was able to crawl between, so, you if you almost built like a solid wall with these blocks, and since they're tongue and groove, they're integrated, it would take more effort for somebody to get some equipment to drag one of those away and knock it down.

Not to say anything, as we heard testimony, nothing's vandalproof. I guess if somebody really has a will, they could do anything. So, by placing the blocks together, that would significantly, in my opinion, you know, deter someone gaining access.

Q Have you reviewed the drainage report that was

submitted by the Department of Transportation?

A Yes, I have.

Q And, do you have any comments regarding the methods used in preparing the report?

A Yes. The report was prepared consistent with acceptable engineering practices. I agree with the conclusions that were set forth in the report. It appears unlikely that the water flowing down towards the portals is from the highway above. Mr. Blose and I did take a little cursory inspection up there on the State Highway above the Tunnel, and like he says, with the super elevation, the water appeared to drain away from the area of the Tunnel.

Q And have you reviewed the report on the stability of the East Brady Tunnel?

A Yes, I have.

Q That was the one that was coauthored by Mr. Lasko and Mr. Elliott, correct?

A Yes.

Q And do you have any comments regarding the methods used in preparing that report?

A Yes, the report again was prepared consistent with acceptable engineering practices, and of course the report was very thorough and detailed.

Q And, does the --- is the Bureau's position that it agrees with the conclusions set forth in the --- both the

drainage report and the Tunnel stability report?

A Yes, it is.

Q Thank you.

MR. SALAPA: That's all that I have, Your Honor.

JUDGE NEMEC: Cross?

CROSS-EXAMINATION

BY MR. SMITH:

Q Mr. Hull, is this Tunnel --- have you investigated or examined tunnels before, as part of your duties?

A My only experience with a tunnel is a construction of a tunnel, not an inspection, but a relining of a tunnel down in West Virginia.

Q Is a tunnel part of the railroad facility, ordinarily?

MR. SALAPA: Objection. Calls for a legal conclusion. Mr. Hull's not a legal expert.

MR. SMITH: No, but he works on tunnels as ---

BY MR. SMITH:

Q Have you worked on tunnels or as facilities of the railroads or utilities?

JUDGE NEMEC: I don't know where you're going with this. First of all, I sustain the objection, the first objection.

MR. SALAPA: Object as to relevance.

MR. SMITH: Your Honor, he said that he works on the inspection and evaluation of utility, transportation and safety, and within the scope of his work, he --- you --- he examines ---

JUDGE NEMEC: But the Tunnel was built by a railroad.

MR. SMITH: It's a facility. Now, he can say that --- and it may be ---

JUDGE NEMEC: So what?

MR. SMITH: --- (Continuing) --- may be all in the question of law ---

JUDGE NEMEC: So what?

MR. SMITH: --- (Continuing) --- whether it's a facility --

JUDGE NEMEC: So what? Ask him something about his testimony.

MR. *SMITH: Well the "So what?"* is, Your Honor, that at some stage, the Supreme Court of Pennsylvania may have to determine if this is a facility which is subject to your jurisdiction, on the part of the railroad.

JUDGE NEMEC: They may, but it's not going to be based on the testimony of this witness.

MR. SMITH: If he tells us, Your Honor, that this is a facility in a normal practice and usages of the Public Utility Commission, then it may be.

JUDGE NEMEC: That makes --- "the normal practice and usage of the Public Utility Commission." Do you want to clarify just exactly what you mean by that? The record's clear here, sir, that the rail --- some railroad, at some time, built this tunnel, and it was used for railroad purposes.

MR. SMITH: Now, the question becomes when does that use for railroad --- when does the railroad get discharged from its liabilities and responsibilities concerning a tunnel as a facility?

JUDGE NEMEC: That's a legal question, sir.

MR. SMITH: Yes, but, if the tunnel is treated as a facility, for inspection and safety evaluations by the Public Utility Commission, and this witness has said that he --- that his duties include transportation and safety involving Public Utilities, then I think that it's important for the Court to --- know not only this court and the Appellant Court to know, that this is a facility normally examined by the Public --- normally examined by the Public Utility Commission, relative to issues of safety.

JUDGE NEMEC: Yes, but it's not going to be based on your cross-examination of this witness. It'll be based on the entire record and legal argument and decisions --- recommended Decision of mine and the Commission's findings.

MR. SMITH: Respectfully, Your Honor, this witness can testify that, in normal course of his duties and functions, that this is a type of facility, in which he and other persons within the Public Utility Commission, investigate and evaluate on a public safety basis. And that, I think, is important. That's all I was trying to ask him. Has he examined --- he said he has examined the tunnel or the construction of a tunnel.

JUDGE NEMEC: And why did he examine it?

MR. SMITH: That's what I was going to ask him about.

JUDGE NEMEC: He's talked about it. That was his testimony.

BY MR. SMITH:

Q Did you examine the Tunnel, in the course of your duties as a representative of the Public Utility Commission?

A Yes, I did.

Q Now, is this a similar tunnel, of the type that would be used in the operation of a railroad?

A I must say this Tunnel was a facility of the railroad, to transport rail traffic from one end of the hill to the other.

Q That's all I have on that question.

Now, I have a recollection that you went to this Tunnel in the past, in addition to this occasion?

A That's correct.

Q And, it's true, is it not, that you stated that you would not go through the Tunnel because you didn't feel it was safe?

A Without proper equipment, yes. I can elaborate why, because as we heard today's testimony, it's brick lined, and, of course, if brick fell from the Tunnel, an engine --- probably wouldn't harm an engine, or --- but, I mean, if one of these sections of brick would fall on a pedestrian, you know, without a hard hat, I mean, you get hit on the head, I think with

testimony like 23 feet, there'd be a lot of weight on that brick if it came down. So, that's why, before it would ever become pedestrian safe, you'd have to make sure all those bricks were either removed or, you know intact.

Q Well then, does it present a safety problem in its present condition, for pedestrians transversing the Tunnel?

A That's why ---

MR. PRICE: I object that he doesn't have the expertise in ---

MR. SMITH: He's the Safety Engineer.

MR. PRICE: He's asking him if the bricks are loose, and he hasn't done an examination of the bricks.

JUDGE NEMEC: Sustained.

BY MR. SMITH:

Q Do you have any basis for concluding that this is not a safe area for pedestrians?

MR. SHARP: Objection. I don't think there's any foundation laid that this is a pedestrian facility being used right now. My --- it's been sealed. There's been no foundation by this witness.

JUDGE NEMEC: Sustained.

BY MR. SMITH:

Q Do you have any basis for --- professional basis for the conclusion that this is not a safe area for people who are not properly equipped for tunnel work?

A Well, obviously, it's not even lit for pedestrians. It's not even lit. So, I mean, as you heard testimony today on the curve, if you got halfway in that Tunnel, it would be awful dark. I mean --- so, I mean, if you ever used it for any sort of facilities in the future, I mean, a train has lights on, but, I mean, it's not even lit. I don't know if when you go out halfway through that tunnel, if you could even see.

JUDGE NEMEC: Okay.

BY MR. SMITH:

Q And you say that you crawled between the blocks to gain access?

A I did on the south portal, yes.

Q Understand. Okay.

Can a child do that?

A Yes, they could.

Q And, do you think if this Tunnel was --- the entrance to the Tunnel was obstructed completely with concrete blocks, cemented in place, would that prevent entry, under normal circumstances?

A Define "completely."

Q Unless somebody would use some mechanical device to dislodge the block.

A Well, like I said, they should be stacked high enough that, you would need some sort of equipment to get over them, like a ladder. I believe the blocks now are eight-foot high,

where I would not have been able to scale it without a rope or a ladder, if I couldn't have gotten through the blocks.

Q Maybe we have a misunderstanding of the type of block we're talking about.

JUDGE NEMEC: Yes, he --- I'm sorry, but he --- Mr. Smith is suggesting that you block and cement the entire entrance.

MR. SMITH: Eight by 12 block.

JUDGE NEMEC: I mean, it's a given. If you block and cement the entire entrance, nobody can gain access.

MR. SMITH: Well, he's the Safety Inspector and I'm going to ask him ---

JUDGE NEMEC: That's okay. that being --- this is common knowledge. And you're going on and on.

MR. SMITH: Fine. Thank you. That's all I have.

JUDGE NEMEC: Any other questions?

(No response.)

JUDGE NEMEC: Okay. You're excused, sir.

THE WITNESS: Thank you.

(Witness excused.)

JUDGE NEMEC: Okay.

We'll get the additional submissions from Conrail within 30 days, and I'll probably solicit comments from the parties with regard to what you want to do and then I'll probably establish --- well, depending on what happens, then, sometime thereafter, we'll get a briefing schedule out.

Let's go off the record.

(Whereupon, at 5:24 p.m., the hearing was adjourned.)

C E R T I F I C A T E

I hereby certify, as the stenographic reporter, that the foregoing proceedings were taken stenographically by me, and thereafter reduced to typewriting by me or under my direction; and that this transcript is a true and accurate record to the best of my ability.

COMMONWEALTH REPORTING COMPANY, INC.

By: James R. Obringer

RECEIVED
01 JUN 28 PM 1:48
P.A.P.U.C.
SECRETARY'S BUREAU