

EXHIBIT J

IN THE UNITED STATES DISTRICT COURT
FOR THE MIDDLE DISTRICT OF NORTH CAROLINA

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 NORTH CAROLINA STATE)
 CONFERENCE OF THE NAACP,)
 et al.,)
 Plaintiffs)
 V.) 1:13CV658
 PATRICK LLOYD MCCRORY, in)
 his official capacity as)
 Governor of North Carolina,)
 et al.,)
 Defendants

-----x
 LEAGUE OF WOMEN VOTERS OF)
 NORTH CAROLINA, et al.,)
 Plaintiffs)
 and)
 LOUIS M. DUKE, et al.,) 1:13CV660
 Plaintiffs-Intervenors,)
 V.)
 THE STATE OF NORTH CAROLINA,)
 et al.,)
 Defendants

-----x
 UNITED STATES OF AMERICA,) 1:13CV861
 Plaintiff)
 V.)
 THE STATE OF NORTH CAROLINA,)
 et al.,) PAGES 1-398
 Defendants

-----x
 VIDEOTAPED DEPOSITION OF DR. THEODORE TETREAULT ALLEN

Wednesday, June 18, 2014

Washington, DC

Reported by: Sherry L. Brooks, CLR

Job No. 146799

1 A. No.

2 Q. Have you ever registered a voter to vote?

3 A. No --

4 Q. Okay.

5 A. -- except for myself.

6 Q. Well, that's good.

7 Describe the areas in which you claim that
8 you're an expert.

9 MR. HO: Objection.

10 BY MR. FARR:

11 Q. If he objects, that just means he doesn't
12 like the way I asked the question. Unless he tells
13 you not to answer the question --

14 A. So you're asking me to enumerate all the
15 things that I would consider myself to be an expert
16 in right now or just the ones that relate to this --

17 Q. No. I'd like to know all the things that
18 you're an expert in.

19 MR. HO: Objection.

20 THE WITNESS: Okay. I would say I'm an
21 expert in waiting line analysis, which relates to

1 queuing theory. I'm an expert on simulation, which
2 also relates to waiting lines and queuing theory.
3 I'm also an expert with respect to an area called
4 design of experiments.

5 I'm an expert with respect to an area
6 called optimization under uncertainty and simulation
7 optimization and I'm an expert at -- related to
8 certain types of election system applications of
9 operations research techniques.

10 I'm an expert related to certain aspects
11 of cyber security decision-making, and so those are,
12 I would say, the primary areas where I consider
13 myself to be an expert.

14 Q. Are you an expert in psychology?

15 A. No.

16 Q. Are you an expert in psychiatry?

17 A. No.

18 Q. Okay. Going back to an earlier set of
19 questions that I asked, have you ever been present in
20 a precinct while ballots were being counted?

21 A. No.

1 A. I want to say no. I don't think so.

2 Q. Okay. What is your definition of a long
3 line?

4 A. Right now?

5 Q. Yes.

6 A. I would say over 30 minutes has become a
7 reasonable definition of that term.

8 Q. And how was that definition obtained or
9 understood by you? Where did that come from?

10 A. The 30 minutes?

11 Q. Um-hum.

12 A. Well, I mean, President Obama's speech.
13 He gave a speech about how 30 minutes was a target
14 for the country, so that influenced me. It
15 influences me.

16 Q. Are you aware of any court decisions
17 upholding that the line should be no more than 30
18 minutes?

19 MR. HO: Objection.

20 THE WITNESS: Well, I'm not a legal
21 expert, but I have been involved in another lawsuit,

1 and that has caused me to learn that there have been
2 -- in the case record situations in which elections
3 -- where there were lines over two hours.

4 And that caused -- I believe -- I'm not an
5 expert. I don't recollect it that carefully, but I
6 believe that lines over two hours in the past in
7 America have caused people to get a new election --
8 or to have some level of disqualification of results.

9 I'm not surely exactly what happened, but
10 I've heard that two hours is a limit that has some
11 legal standing.

12 BY MR. FARR:

13 Q. Can you cite any of those cases to me?

14 MR. HO: Objection.

15 THE WITNESS: I can get that information
16 to you if you want me to.

17 BY MR. FARR:

18 Q. We'd like to have that.

19 A. Yes. It will take me a bit of time to dig
20 it, but I'd be happy to try and dig it up for you,
21 sir.

1 that the effect of doing that will shift voters to
2 other days. Some of them will vote on election day.

3 We don't -- and then those ones voting on
4 election day will increase the expected waiting times
5 of the people on election day and the effect of
6 increasing the waiting times will deter -- we can
7 expect it will deter some number of voters from
8 voting.

9 I have provided ranges for the increases
10 in -- the hypothetical increases in the expected
11 waiting times and also in the number of deterred
12 voters.

13 Q. I want to turn your attention to paragraph
14 7 of your report.

15 And I want to ask you about a sentence
16 that you have in paragraph 7 that says: "In Franklin
17 County, I proposed and was the technical leader for
18 the implementation of perhaps the first principled
19 approach for deciding how many voting machines are
20 needed and how they should be allocated to maximize
21 efficiency and minimize waiting time to vote here."

1 Do you see that?

2 A. Yes.

3 Q. What did you mean by "first principled
4 approached?" Does that mean anything anywhere in the
5 world? anywhere in the country? anywhere in Ohio?

6 A. Well, I'm not an expert on world history
7 and all of the things that people have done all over
8 the world, but that's why I said perhaps because I'm
9 not sure.

10 As I understand it, however, from talking
11 with reporters and officials around the country and
12 people from other countries, there's a general lack
13 of awareness of the length of the ballots in certain
14 locations, not every place.

15 But certain locations, I want to
16 particularly say Ohio, Florida, California, Virginia,
17 and maybe some other places as well, the ballots are
18 much longer than people realize and they're also much
19 more varied than people realize.

20 And because they're varied, you -- it's --
21 in my opinion, it is not "principled," as I would say

1 it personally, to allocate resources without taking
2 into account the service times, essentially, or the
3 ballot length.

4 And yet there are states where the law is
5 either explicitly provision resources based on the
6 number of registered voters or likely voters or imply
7 that, and that, in my opinion, is not a principled
8 thing to do.

9 If some people in some location are,
10 essentially, doing a task that takes twice as long as
11 another location and they're not given more resources
12 to do it, then, in a sense, they're being
13 discriminated against. And I find that, as I would
14 say, in my words, unprincipled.

15 Q. Okay. Have you had any discussions with
16 the North Carolina State Board of Elections about how
17 voting machines are assigned to precincts in North
18 Carolina?

19 A. Have I had discussions with --

20 Q. With anybody in the State Board of
21 Elections about how voting machines are assigned to

1 precincts or early voting centers in North Carolina?

2 A. No.

3 Q. Have you talked to any county Boards in
4 North Carolina about how voting machines are assigned
5 to early voting or on election day to precincts?

6 A. No.

7 Q. Okay. Did you -- in making your
8 principled approach in Franklin County, did you look
9 at any other factors, besides length of the ballot?

10 A. In developing the amount -- yes, I looked
11 at several other factors, but in our final decision
12 process that I helped to implement, we just -- I led
13 the decision process to not include demographic
14 factors and other factors because I -- from my
15 analysis of the 2004 election, which I was a
16 consultant and was paid to do, I concluded that the
17 discrimination was likely unintentional and the
18 result of failure to take into account the variable
19 ballot length.

20 So by simply taking into account the
21 variable ballot length, which is the kind of thing an

1 industrial engineer would do if we were trying to
2 decide how many machines to put in a line at Honda
3 (sic) -- if the machine was twice as slow, we would
4 think, okay, maybe we need more of those machines.

5 And so with just doing a simple principled
6 approach, without necessarily complicating it with
7 education issues or demographic factors, other than
8 education or first-time voting issues, I believe that
9 I was able to, with the team, propose and implement a
10 principled approach that effectively reduced the
11 problem without any major unintended consequences.

12 Q. Okay. Did you analyze the number of
13 voters in a particular precinct as a factor?

14 A. Yes.

15 Q. That was a factor you looked at?

16 A. Right.

17 Q. Okay. And did you look at the number of
18 poll workers in the precinct as a factor?

19 A. Yes.

20 Q. Okay. In 2004, Dr. Allen, did Franklin
21 County have early voting?

1 A. No.

2 Q. So your study of Franklin County was based
3 upon an election system where all voters showed up on
4 election day?

5 A. That one, but then I did two other studies
6 with them and they did have early voting.

7 Q. But the problems were in 2004, right?

8 A. Correct.

9 Q. Do you have any experience checking in
10 voters during early voting under a process called
11 "same-day registration?"

12 A. No.

13 Q. Have you ever done that?

14 A. No.

15 Q. Did Franklin County have same-day
16 registration in 2004?

17 A. I don't believe they did. I don't think
18 -- no. I'm pretty sure they didn't.

19 Q. So tell me, what were your -- what were
20 your recommendations -- were your recommendations
21 adopted by Franklin County?

1 A. Yes.

2 Q. And tell me what factors you told them to
3 look at in trying to decide how to set up resources
4 at a precinct.

5 A. The number of eligible voters and the
6 service times related to the ballot length.

7 Q. And what do you mean by "service time?"

8 A. So I mean, if I had to critique -- my main
9 critique of the current situation in America for
10 election officials is that when they buy machines or
11 when they allocate machines, they rarely, in my
12 experience, have timed how long it takes to vote on
13 the machine on the actual ballots.

14 So in my work when I have worked for
15 counties to help them decide how many machines they
16 need and where to put them, I have literally timed
17 how long it takes to vote on their exact machines.

18 And the surprise is, A) it's a lot longer
19 than a lot of people realize; B) it really depends on
20 the type of machine.

21 So, for example, they used to have in

1 Q. Okay. Were you able to form an opinion on
2 whether voters can vote more quickly on the scan
3 machines that you've observed as compared to the
4 touch screen machines?

5 A. It's not a precise opinion because I
6 haven't been able to time people, but I feel like,
7 roughly speaking, voting with the booth, followed by
8 a scan machine in total is approximately the same
9 time as voting on a DRE put together, but the time
10 monopolizing the booth is slightly less than the time
11 monopolizing the DRE, on average.

12 Q. Okay. So that would mean that the booths
13 would be slightly more accessible to voters in
14 counties using scanning systems than counties using
15 DRE or touch screen systems?

16 A. That's my -- again, since I haven't worked
17 in that, I'm not confident in that opinion, but
18 that's my speculation based on the analyses that I've
19 done.

20 Q. Okay. Do you know what systems were used
21 in North Carolina counties?

1 A. I have data about this, yes.

2 Q. Okay. Do you know how many counties use
3 scan systems versus DRE systems?

4 A. My understanding is it's around 64 percent
5 of the counties are using the booths with scanning
6 machines and most of the remainder are using DRE
7 machines.

8 Q. And did you know the legislature has
9 outlawed DRE machines and that they need to be phased
10 out in North Carolina?

11 MR. HO: Objection.

12 THE WITNESS: I did not know that, no.

13 BY MR. FARR:

14 Q. Okay. And if that was true, then -- if
15 all counties in North Carolina used the scanning
16 systems, that would result in less monopolization of
17 a particular voter in a voting enclosure that was
18 using the DRE system under your testimony that you've
19 given; is that correct?

20 A. Well, again, I said that I don't have
21 direct experience timing people on voting booths, but

1 my experience that analyzing the Florida election
2 suggests that, to me, that -- my opinion is that the
3 issues are very similar and surprisingly similar.

4 I would have earlier been -- before I
5 analyzed the 2012 Florida election, I would have
6 thought what I think you're implying possibly that --
7 that paper ballots would be much better from a
8 waiting time point of view.

9 And also my own experience now that I
10 personally vote using paper ballots using absentee.
11 I've timed myself. It's pretty close. It's
12 surprisingly close to the DRE times.

13 That may be because I'm a conscientious
14 voter, but -- I forgot to mention that, yes, I timed
15 myself doing DREs. I've timed myself on -- and it's
16 surprisingly similar.

17 Q. Okay. So you've talked about Florida
18 several times. I want to ask you about that.

19 Were the long lines a problem throughout
20 the state of Florida or just in some isolated
21 counties?

1 A. A lot of counties. I mean, more than you
2 might think. It wasn't isolated. There were long
3 lines pretty much throughout -- there were some
4 places where they didn't have -- and it also depends
5 on what we define long lines.

6 If we say 30 minutes, it was not isolated
7 at all. If we say seven hours, it was isolated. So
8 even if you say two hours, it was a pretty widespread
9 occurrence.

10 Q. Do you have records of where the lines
11 were in the Florida counties and -- you do?

12 A. Yes.

13 Q. Can you make that available to us?

14 A. Yes.

15 Q. Okay. And let me get something out right
16 now.

17 A. So I owe you two things, if that's -- I
18 should make notes on that.

19 MR. HO: It's in the transcript.

20 THE WITNESS: Okay. Good.

21 MR. FARR: I'd like to mark this as

1 Exhibit 131, please, and if you'd hand one to the
2 witness and send the rest to counsel.

3 (Exhibit Number 131 was marked for
4 identification and was attached to the deposition.)

5 BY MR. FARR:

6 Q. No you testified you studied the elections
7 in Florida in 2012?

8 A. Yes.

9 Q. Have you seen this before or something
10 like this?

11 A. I probably did because I actually looked
12 at ballots, too, in Florida because they're on the
13 Board of Elections websites.

14 Q. Okay.

15 A. In fact, we counted how many initiatives
16 there were in a lot of counties. It was a big pain.

17 Q. Okay. So Miami-Dade County, this says
18 it's an official sample ballot from Miami-Dade County
19 -- do you see that? -- for 2012?

20 A. Yes.

21 Q. Was Miami-Dade County one of the areas

1 where they long lines in Florida? Do you recall?

2 A. Honestly, I don't remember that. I

3 apologize. Let me just think a little bit more.

4 Honestly, if you put 30 minutes, almost

5 all the counties had 30-minute waiting lines. So I

6 would speculate that, yes, but it wasn't one of the

7 ones that I carefully studied. I spent most of my

8 time studying Central Florida.

9 Q. Okay. Can you tell the court reporter how

10 many pages this Miami-Dade ballot has for the 2012

11 general election?

12 MR. DONOVAN: Just the English part, Tom,

13 or the other language's

14 MR. FARR: It's the entire document.

15 THE WITNESS: Twelve.

16 BY MR. FARR:

17 Q. It's 12 pages long. Can you tell the

18 court reporter how many different languages appear to

19 be used on this ballot?

20 MR. HO: Objection.

21 THE WITNESS: My understanding is three.

1 BY MR. FARR:

2 Q. Okay. And the offices for elections seem
3 to end on page 3; is that correct?

4 A. Correct.

5 Q. And the remaining eight pages, can you
6 describe what those are, please, for the record?

7 A. Yes. These are -- sometimes people call
8 them issues or referenda. Sometimes they're called
9 amendments. Some of these are amendments, but, in
10 general, they may call them issues or referenda.

11 Q. And there's eight pages of these
12 referenda?

13 A. Yes.

14 Q. And they're in three different languages?

15 A. Yes.

16 Q. And do you know how these things get on
17 the ballot in North Carolina -- or in Florida?

18 MR. HO: Objection.

19 THE WITNESS: That depends on what you
20 mean by that. I feel like I have some of the general
21 outlines known to me of a process for doing such a

1 thing, that you -- if you are an advocate for one of
2 these issues, you apply.

3 You get a certain number of signatures.

4 And if the signatures are verified by a certain time,
5 you get one of these on the ballot.

6 Q. So groups in Florida are able to -- if
7 they comply with whatever the requirements are, they
8 can actually get these initiatives or amendments
9 placed on a statewide ballot; is that correct?

10 A. Correct.

11 MR. HO: Objection.

12 BY MR. FARR:

13 Q. Now, Dr. Allen, in your report, did you
14 look at any data for either the 2006 or 2014
15 elections?

16 MR. HO: Objection.

17 THE WITNESS: Well, so data for the 2014
18 election -- I'm not sure what you mean by that.

19 BY MR. FARR:

20 Q. Excuse me. I'm sorry. I meant the 2006
21 and the 2010 election.

1 MR. HO: Same objection.

2 THE WITNESS: The 2010 election,
3 definitely.

4 BY MR. FARR:

5 Q. You did?

6 A. Yes.

7 Q. Okay. Did you look at the 2006 election?

8 A. Yes. I probably did.

9 Q. Okay. We'll look at that as we go through
10 your report.

11 A. Okay.

12 Q. I'm now going to hand you something we're
13 going to mark as Exhibit 132.

14 (Exhibit Number 132 was marked for
15 identification and was attached to the deposition.)

16 BY MR. FARR:

17 Q. Did you look at any sample ballots for
18 North Carolina in conducting your analysis?

19 A. Yes.

20 Q. Okay. Is this -- this says it's an
21 official ballot, Wake County, North Carolina November

1 2nd, 2010.

2 Would you dispute that that's what this
3 is?

4 A. No.

5 Q. Okay. And how many pages is this ballot?

6 A. One.

7 Q. Does it have any referendum or proposals
8 on it similar to the Florida ballot?

9 A. No.

10 Q. Is it printed in more than one language?

11 A. No.

12 Q. Do you -- between Exhibit 131 and 132,
13 which one of those ballots do you think it would be
14 -- which one would voters be able to complete more
15 quickly?

16 MR. HO: Objection.

17 THE WITNESS: I'm confident that the North
18 Carolina one would be able to be completed more
19 quickly by a conscientious voter. Some people just
20 don't --

21 BY MR. FARR:

1 (Exhibit Number 133 was marked for
2 identification and was attached to the deposition.)

3 BY MR. FARR:

4 Q. And Dr. Allen, I want to correct something
5 for the record. Go back to 132. This looks like
6 it's one page because of the way my assistant copied
7 it, but I really think it's a two-page ballot, so I
8 don't want to mislead you on that.

9 A. Thank you.

10 Q. Exhibit 133 is a sample ballot for Wake
11 County, north Carolina November 6th, 2012.

12 Do you see that?

13 A. Um-hum.

14 Q. Do you have any reason to dispute that's
15 what this is?

16 A. No.

17 Q. And can you tell me how many pages this
18 ballot would have been?

19 A. So, again, I speculate that it would be
20 two pages, but you might know better that it might be
21 three for some technical reason.

1 Q. No. This one is two pages.

2 A. Okay.

3 Q. And this is two pages versus the Florida
4 ballot, which was 11 pages?

5 A. Yes.

6 Q. And it's printed in English?

7 A. Yes.

8 Q. Between the Florida 2012 ballot and the
9 Wake County 2012 ballot, which one of these do you
10 think would be -- which one would a voter most likely
11 complete more quickly?

12 A. The North Carolina ballot.

13 Q. Okay. Alright. Thanks. That's all I
14 have on that.

15 Now, I want to ask you about the articles
16 that you've cited on page 3 in your report, which is
17 Exhibit 130.

18 And before we get to that, Dr. Allen, you
19 don't know, one way or the other, whether some county
20 Board in North Carolina has taken a principled
21 approach to assigning voting machines to precincts in

1 North Carolina, do you?

2 A. To assigning voting machines?

3 Q. Um-hum.

4 A. I don't know that for a fact, no.

5 Q. Okay. Alright. I want you to go through
6 and -- I want to ask you some questions about these
7 articles that you've cited.

8 The first one is Allen, T.T.,
9 "Introduction to Discrete Events Simulation Theory
10 and Agent-Based Modeling: Voting Systems, Health
11 Care, Military, and Manufacturing."

12 Could you tell me what that article was
13 about?

14 A. Back on your earlier question, if you
15 don't mind --

16 Q. Sure. You can always go back when you
17 want to.

18 A. I don't know what people have done in
19 North Carolina, but I have talked to people who are
20 interested in election systems from around the
21 country who also are interested in operations

1 MR. BOWERS: I think that's what you're
2 referring to.

3 MR. FARR: Yes.

4 BY MR. FARR:

5 Q. In your report, you're looking at the
6 scheduled time for closing and the closing time being
7 the time that the last voter has voted and left the
8 precinct.

9 Isn't that what you say in paragraph 21?

10 A. Yes.

11 Q. Okay. And then you also say that's a good
12 approximation for wait time.

13 A. I said "that gives us a reasonable
14 estimate of waiting times."

15 Q. Okay. And then you said that -- unless
16 I'm wrong, you said that waiting time, as you were
17 defining it, is the point in time where the voter is
18 able to go to the machine and vote -- how long it
19 takes them to get to the machine to vote.

20 A. You mean it's the total sojourn time minus
21 the service time? So, yeah. There might be some

1 time in exiting, also, but yes.

2 Q. Okay. So are you saying that the total
3 sojourn time in paragraph 21 is 30 minutes, that this
4 is the proxy you're using?

5 A. Yes, because, see, 30 minutes -- the
6 voting times are relatively short, you know, on
7 average -- you know, it's ballpark.

8 Let's approximate it around four minutes,
9 so it's relatively negligible compared to, say, for
10 example, poll closing time of an hour, two hours.
11 Four minutes is relatively small, so that's why it's
12 a reasonable approximation.

13 Q. Okay. But you say in 21 that the proxy
14 for waiting time is the 30 minutes between the time
15 the poll was scheduled to close and when the poll
16 actually closes because the last voter has voted?

17 A. Yeah.

18 Q. Well, that includes more time than what
19 you have today described as waiting time, which is
20 when you get to the voting machine?

21 A. Right, the four minutes.

1 Q. So your term of "waiting time" in
2 paragraph 21 is different than the definition you've
3 given me today.

4 A. Well, it's a reasonable estimate, so
5 you're disputing whether you think that's a
6 reasonable thing.

7 So I find that -- if the poll -- like, for
8 example, if the polls close seven hours longer, for
9 example, in Florida than after the poll closing time,
10 the voting time of that voter was truly negligible
11 compared to the amount of time they spent waiting.

12 So that's why I used poll closing times as
13 a reasonable estimate. That's what I -- that's my
14 term that I refer to it.

15 Is it -- would it maybe be more correct to
16 subtract the four minutes or however many minutes it
17 is, because, for example, in Florida it's a bit
18 longer than four minutes on average? I would agree,
19 yes, if that's what you're saying.

20 Q. Okay. And also didn't you tell me that
21 there could also be some time during the 30 minutes

1 between the scheduled closing and when the polls are
2 actually closed when there are no more voters voting,
3 but the precinct officials are doing something else
4 and they're taking a few more minutes to close the
5 precinct?

6 MR. HO: Objection.

7 BY MR. FARR:

8 Q. Didn't you say that earlier?

9 A. It could happen. In some cases, yes. In
10 other cases, no.

11 For example, as I understand it in the
12 work that I've been doing in New Mexico, they
13 actually use the DRE machine -- sorry -- the scan
14 machine time as the closing time.

15 Q. Okay. And do people -- is the arrival
16 rate at a precinct the same all day? Is it constant?

17 A. Okay. Clearly, no, but what you're
18 talking about is an average arrival rate, so it's
19 random. Every location is different, and so it's a
20 random process.

21 That's why in this work we use what's

1 feel that the Poisson Process is a reasonably
2 conservative way to approximate the system.

3 And that, you know, if I -- I have used
4 nonhomogeneous Poisson Processes, which basically
5 means -- nonhomogeneous means -- so the homogeneous
6 Poisson Process means that the average arrival rate
7 is constant.

8 Nonhomogeneous means that it can go up and
9 then it can go down. So in my simulations, I have
10 used nonhomogeneous sometimes, but it's not a huge
11 effect. We've studied that.

12 Q. But you agree that the time the poll
13 closes is going to be one of the largest points in
14 the day for turnout by voters?

15 A. I would say, yes. It's a higher turnout
16 rate.

17 Q. Okay. And do patterns of turnout during
18 the day differ in different parts of the country?

19 A. Yes, probably.

20 Q. Okay. And you would also say that the
21 waiting time is longer, typically, at the time the

1 comparison.

2 A. Okay. What we say in the -- what I say in
3 the report is that this gives a reasonable estimate
4 of waiting times, and I didn't quantify whether that
5 -- if you asked me to quantify what it is, to me,
6 it's a reasonable estimate of the 95th percentile
7 waiting time for that location.

8 That's what it actually gives, so it gives
9 a reasonable amount estimate of that. I agree with
10 you that maybe -- I almost wish I had said a
11 reasonable estimate of the waiting times, if you
12 subtract the service time, which is, generally, close
13 to negligible, but not always.

14 Q. You say 95th percentile. Does that mean
15 95 percent of the people vote at the time the polls
16 close?

17 A. No. It means that -- what I mean by that
18 is 95 percent of the people would have waited less
19 than that.

20 Q. Would have waited less than --

21 A. That person, yes, so the person who votes

1 the last is very likely among the people who waited
2 longest.

3 Q. So 95 percent of the voters of that
4 precinct waited a shorter amount of time?

5 A. Than that person, correct.

6 Q. Okay.

7 A. And then also the 95th percentile, in our
8 simulations and in my understanding, correlates quite
9 well with the average and also the median and other
10 quartiles and they all go together as they depend on
11 the major factors such as the service time, such as
12 the arrival rate.

13 Q. Did you look at any arrival rates for any
14 elections in North Carolina?

15 A. I would say, yes, in a way, because I
16 looked at the number of registered voters and the
17 turnout in past elections.

18 And so without a lot of details, it's a
19 pretty simple system, and we've studied other systems
20 and we've had data to actual arrival -- not just
21 rates, but actual arrivals at other systems.

1 As a reasonable approximation, in my
2 opinion, we can take the number of people who are
3 voting and spread them out over the day, according to
4 a Poisson Process -- or actually uniformly, which
5 doesn't sound -- what it sounds in a technical sense.

6 And that is very likely an accurate, quite
7 reasonable, and professionally sound way to model the
8 arrivals.

9 Q. But this is a theoretical way of assessing
10 arrival rates. You didn't look at actual data on
11 arrival rates in North Carolina at each precinct?

12 A. Yes, because I was not given that and I --
13 they probably have information that's pertinent to
14 that in terms of the DRE machines, the locations that
15 have DRE machines, because the DRE machines store
16 when people actually voted, but, again, that's not
17 when they arrived.

18 So it's hard to get data. In fact, it's
19 almost impossible to get data on the arrival, unless
20 -- and there have been studies where people literally
21 are there timing the arrivals.

1 Q. But that wasn't -- you didn't have
2 information along those lines for North Carolina?

3 A. No, I didn't.

4 Q. Okay. Now, I want to ask you about your
5 publications on page 3, 4. You've got several
6 publications there about election issues?

7 A. Yes.

8 Q. What's a simulation --

9 A. Well --

10 Q. -- as it relates to this topic we're
11 discussing?

12 A. Okay. So I'm not an expert on all forms
13 of simulation, but I do consider myself to be an
14 expert on one major form of simulation called
15 "discrete event simulation."

16 Discrete event simulation relates to the
17 use of random numbers to model and predict waiting
18 times or inventory in complex systems.

19 Does that answer your question?

20 Q. Um-hum.

21 A. There are other -- I mean, just FYI -- I

1 reformers have cheered the quick about-face of
2 Florida legislators, and have expressed guarded
3 optimism about President Obama's interest to fix
4 election lines, the cause of long lines in Florida
5 and throughout the country, still remains unknown."

6 Do you agree or disagree with that?

7 A. Yeah. I have brief dealings with
8 Professor Stewart, but I feel that that
9 characterization is misleading.

10 Q. Okay. And what about -- further in that
11 paragraph, it says: "But scientific approaches to
12 the problem of long lines remain in their infancy."

13 Do you agree or disagree with that?

14 A. I also disagree with that conception. I
15 find that strange. You know, see, the thing is --
16 you know, I looked on Wikipedia and this famous guy
17 -- this Danish guy, Erlang, invented the M/M/c
18 queues, and that's why they call them the Erlang
19 queues in the 1920s -- sorry.

20 He died in 1927, so, you know, there were
21 plenty of smart people in 1927, but, you know, did I

1 know it? I wasn't existing, but, you know, different
2 industries accept and become knowledgeable about
3 different technologies at different times.

4 So, you know, we, in industrial
5 engineering, feel like sometimes we have a little bit
6 of an edge and something to bring to industries, and
7 sometimes we encounter industries that simply are
8 unaware of technologies.

9 Other times, we go to the industry like in
10 design of experiments like when I went to Lincoln
11 Electric, and I'm, like, these industry people know
12 more about it than I do, to some extent.

13 So we encounter all levels of
14 sophistication when we work with companies and
15 industries, and sometimes we find industries that
16 are, you know, very advanced and other times we find
17 industries that are way behind the times.

18 And I feel like he is expressing partly of
19 the truth, that maybe the applications of queuing and
20 waiting systems have not penetrated, despite my best
21 efforts, the election systems industry and other

1 people -- I know some other people who are making
2 that effort, but that doesn't mean that the science
3 of waiting lines is in its infancy.

4 You know, the science of waiting lines in
5 a way was pretty advanced in 1927, so I find that
6 that only tells part of the truth.

7 Q. Well, he wasn't talking about the science
8 of waiting lines. He was talking about the science
9 of waiting lines as applied to election systems.

10 That's different, isn't it?

11 A. Okay. Then I would say -- I wouldn't say
12 the science -- see, that's another thing.

13 The science of waiting lines is very
14 advanced. The science of applications of waiting
15 lines -- or sorry -- the applications of waiting
16 lines to election systems, despite my humble efforts
17 and efforts by some other people that I know, is not
18 very developed.

19 And I think part of it has to do with the
20 culture of the election officials and the nature of
21 the their jobs.

1 They're very smart people and they try
2 hard and they care a lot, generally -- that's the
3 people I've run into -- but, for whatever reason,
4 their primary function is hiring and training poll
5 workers.

6 They're not -- they're not incentivized or
7 excited about applying technologies that other
8 industries, fast-food, entertainment like Disney, the
9 military, even, you know, health care systems -- you
10 know, the waiting systems in a way are on the simple
11 end of the kinds of complexity that we observe in
12 manufacturing or other industries.

13 And, you know, the study of waiting lines
14 and their application in those other industries is
15 extremely advanced and the science is very advanced,
16 too. Do you see what I'm saying?

17 To me, science is quite advanced.

18 Application, in this particular industry, I feel is
19 surprisingly poor.

20 Q. Okay. Let's turn to page 2. I want to
21 read something from the paragraph that's got a 443

1 star next to it.

2 It says: "Causal empiricism suggests that
3 most people believe long lines deter lower-income
4 voters, who have less flexibility in their days, and
5 who are more likely to be hourly employees, and thus
6 feel the wait in line pinch the pocketbook.

7 However, a contract argument could be
8 made. Despite the fact that upper-income voters are
9 less likely to be paid by the hour, on the margin,
10 their time is more valuable than that of low-income
11 voters."

12 Do you agree or disagree with that
13 statement?

14 A. That truly is beyond my scope. I'm not an
15 expert on political science or demography. I'm an
16 expert on waiting systems.

17 Q. Are you an expert on human behaviors?

18 A. No.

19 Q. Okay. Lets's turn to page 3 of this
20 document. I'm going to ask you -- I want to read a
21 sentence that's in the paragraph that's got a star

1 440.

2 "In short, long lines can form for reasons
3 other than a mismatch between arrival and optimal
4 service rates or a mismatch between the number of
5 points-of-service and the number of voters."

6 A. You said 440, not 444?

7 Q. It's on page 3 and there's a star 444.

8 A. Oh, 444. Thank you. I appreciate it.

9 Q. Yeah. I'll read it again. "In short,
10 lines can form for reasons other than a mismatch
11 between arrival and optimal service rates or a
12 mismatch between the number of points-of-service and
13 number of voters."

14 Do you agree or disagree with that?

15 A. I find that that language is imprecise in
16 trying to speak to the general audience, so I find
17 that that language is not -- waiting lines are a
18 fairly simple phenomenon, and I feel that that could
19 be misleading to people.

20 Q. Okay. Let's turn to page 5. The second
21 paragraph on that page -- I'm going to read something

1 -- "the study of waiting times to vote is in its
2 infancy also because the data available to test the
3 types of relationships identified above do not
4 exist."

5 Do you agree or disagree with that
6 statement?

7 MR. HO: I'm going to object to that
8 because you've omitted what the reference is.

9 MR. FARR: Well, he's had time to read the
10 document. He's certainly able to refer back to it,
11 if he wants to.

12 THE WITNESS: Okay. What's your question?
13 I apologize.

14 BY MR. FARR:

15 Q. Well, he says: "The study of waiting
16 times to vote is in its infancy because the data
17 available to test the types of relationships
18 identified above do not exist."

19 Do you agree or disagree with that
20 statement?

21 A. So he's using a metaphor saying like a

1 study is like a child; it's a baby or not a baby, so
2 it's imprecise language, honestly. It really is.
3 But definitely, there's a lot more data
4 that we could have and might have in the future to
5 help improve these waiting systems, so I agree with
6 that.

7 Q. Okay. And the next paragraph he says:

8 "Finally, the study of waiting times is in its
9 infancy because measures of waiting to vote are
10 primitive."

11 Do you agree or disagree with that?

12 A. Well, see, I have a different perspective
13 than Dr. Stewart. I respect him and who he is and I
14 have great admiration for the political science
15 department at MIT. I know some other people there,
16 at least one other person, and so they're very smart
17 people and very together.

18 But he doesn't have the perspective that I
19 have. I have the perspective of helping people to
20 apply waiting systems for many industries and I've
21 observed or participated in many different kinds of

1 projects.

2 And compared to some of the other systems
3 that I've worked in, actually, waiting times in
4 voting offer some nice opportunities that are
5 actually less primitive.

6 So, for example, you know, I know people
7 who worked at Taco Bell. They didn't have some of
8 the data and they never could easily get and would
9 never get some of the data that we have.

10 Like the poll closing date is actually --
11 you know, we talked about how it has limitations, in
12 the sense that there's some things we don't know
13 about it, but it's beautiful in other ways.

14 The people at Taco Bell would love to have
15 data that would be proportional to the actual lines
16 at multiple locations, depending on multiple
17 approaches that they might take.

18 So in a way, compared to some other
19 domains that are really people earning their living,
20 applying these type of tools to right now and have
21 been for years, is not primitive.

1 So I have a different perspective than he
2 has, so I would emphasize things differently than he
3 does.

4 Do we both agree that going forward there
5 could be a lot more instrumentation and a lot more
6 data and this system could really be tuned up better?
7 Yes, definitely.

8 So if he's trying to emphasize that
9 there's a bright future, yes, but if he's trying to
10 say that -- you know, that this is a particularly bad
11 domain compared to other domains, I don't -- he
12 probably doesn't know as much as I do about that
13 issue, and my answer is, no.

14 Actually, there's some -- some of the
15 really bright spots for election systems are they're
16 pretty simple. There's not a lot going on with them.

17 We actually have the poll closing time
18 data, which a lot in the industry you don't have
19 anything like that. Wish you did. And, you know,
20 generally speaking, the people are pretty educated
21 who are running them and well-meaning.

1 So there's a lot of positives for this
2 that make it, I would say, less primitive than some
3 other domains. So do you see what I'm saying?

4 I don't think he has the experience that I
5 have to compare. Primitive compared to what? And I
6 feel like I have more knowledge about that than maybe
7 he does.

8 Q. Okay. Let's read one more line on that
9 same page where Dr. Stewart says in the last
10 paragraph before Roman numeral 3: "For many reasons,
11 empirical and theoretical, we are still in the
12 infancy of understanding why some voters wait a long
13 time to vote, while others waltz right in, do their
14 business, and waltz right out."

15 Do you agree or disagree with that?

16 A. Again, I feel like that -- if you're
17 emphasizing that's the brighter future part of it, I
18 agree.

19 If you're saying that the waiting systems
20 are supercomplicated and that we don't really
21 understand what's happening with them, I would say,

1 no.

2 On the spectrum of things that I have
3 applied and seen applied and seen people earning
4 money and helping systems, helping airplanes, helping
5 ports, helping Taco Bell, helping all of these places
6 with this type of technology, you know, this is not a
7 particularly mysterious queuing system compared to
8 the alternatives.

9 THE VIDEOGRAPHER: Sorry. We're at five
10 minutes on the tape.

11 BY MR. FARR:

12 Q. Alright. Isn't Dr. Stewart here talking
13 about what motivates some people and how some people
14 process about versus the way other people process
15 about?

16 A. Could be. I don't know exactly what's
17 going on in his head.

18 Q. Okay. But you have testified you're not
19 an expert on human behaviors?

20 A. It depends on what you mean by that, but
21 in terms of humans coming in and waiting at voting

1 difference between deterministic and stochastic?

2 A. I know. In what sense is there a
3 difference?

4 Q. Well, I'm asking you. I don't know.

5 A. Well, that's what I'm saying. The
6 deterministic model could actually be more accurate,
7 depending on the nature of the system. The
8 deterministic model could give you the true mean
9 you're trying to predict exactly every time.

10 The stochastic model could be trying to
11 predict the exact same true mean and it would add
12 noise to it.

13 Does that answer your question?

14 Q. No, not really. I mean, what's different
15 about the approach that's used with a deterministic
16 model versus a stochastic model? Are they different
17 in approach?

18 A. Well, okay --

19 Q. Are they based on different assumptions?

20 A. No. They can be based on the exact same
21 assumptions.

1 Q. Well, are they exactly the same? Does
2 deterministic mean stochastic?

3 A. Okay. I think the clearest way to answer
4 this is for people who have studied Calculus -- I
5 don't know if you have, but if --

6 Q. I haven't, but maybe the federal judge
7 has, so you can explain it to him.

8 A. Well, hopefully, he has. Okay. Well --

9 MR. HO: Objection.

10 THE WITNESS: Okay. Well, so the point
11 is, if you have to do an integral, you sometimes know
12 the integral and then you just give a number.
13 Because if you can look it up in a table or you
14 memorized it, you know it, you give me a number.
15 It's exact.

16 Other times when you -- for whatever you
17 don't know how to do the integral, you use what's
18 called Monte Carlo or some other numerical method.

19 Those numerical methods are foolproof and
20 you don't have to think as hard, but they give noise,
21 so that's why we call them stochastic, but you're

1 doing the same integral in both ways.

2 BY MR. FARR:

3 Q. Did you ever hear of two authors named
4 Erikson and Miller?

5 A. Maybe.

6 Q. Did they write an article saying that the
7 election process is a stochastic and not a
8 deterministic system?

9 A. Yeah. I mean, you see -- see, okay. Let
10 me just make a comment here.

11 The word "stochastic" is ambiguous, and I
12 apologize. It's not my fault. It's just a fact.

13 There's different groups of people. I
14 think everyone would say elections are stochastic,
15 meaning random. There's random arrival processes and
16 there's random service processes.

17 One group of people, people who are in
18 this interesting overlap between operations research
19 and statistics like myself, would call this
20 deterministic, if you're using queuing theory, but
21 that could mislead a whole lot of other people what

1 we mean.

2 We are focused -- this group of people
3 focuses on the ability to quickly and reproducibly
4 optimize systems. And for us, there's a practical
5 distinction in how you do it.

6 If you can do the integrals that are
7 needed to be done -- if you can do them perfectly, do
8 them. That's analytical. Then we've, essentially,
9 integrated out the noise.

10 In other cases, there's noise; we can't
11 get rid of it; we don't know how to get rid of it, we
12 then use what we call stochastic simulation.

13 But from the layperson point of view or
14 the federal judge point of view or anybody's point of
15 view who is practical, except for our little
16 community, I would say this is a stochastic system
17 and the queuing theory is also a stochastic model.

18 Q. So the election process itself is
19 stochastic. Is there some randomness associated with
20 it?

21 A. Yes, totally. I apologize. I don't know

1 why -- I mean, maybe I misleadingly put that in here,
2 but that's because I do a lot of papers.

3 And when I'm doing the papers, sometimes
4 we use a stochastic model. They're all stochastic in
5 a sense, but sometimes we use a model with zero
6 noise. In this case, we used zero noise.

7 Q. Okay. But the election process itself, as
8 it functions in real life, is random?

9 A. Yeah, totally, and the queuing model also
10 has a lot of randomness in it. Just because we're
11 able to access the mean perfectly doesn't mean that
12 there's no noise.

13 The queuing model does deal with the
14 noise, but we're just -- thanks to that gentleman,
15 Erlang, that we talked about earlier, we know how to
16 estimate the mean perfectly.

17 Q. Okay. But randomness in election could
18 include things like how many machines are at the
19 precinct?

20 A. Okay. What's random -- the definition of
21 random has an interesting issue, I feel.

1 In most applications of probability and
2 optimization, when I've worked with people, the
3 number of machines has not been a random variable
4 because people told me those things, but -- so that's
5 a parameter in the model.

6 Q. Okay. But the number of machines that
7 might be in a precinct in Franklin County might be
8 different than a similar precinct in Wake County,
9 North Carolina?

10 A. Right. So to me, you could say the number
11 of machines in locations are a random variable in
12 North Carolina.

13 Q. Right. And the number of poll workers at
14 a precinct in Franklin County could be different from
15 a number of poll workers in a precinct in Wake
16 County, North Carolina?

17 A. Yes.

18 Q. And the service time could be different in
19 a precinct in Wake County than Franklin County, North
20 Carolina, right?

21 A. Yes.

1 Q. And how about the interest of the voters
2 to vote in Ohio versus North Carolina? That could be
3 pretty random, right?

4 A. Yes.

5 Q. You could have longer waiting times if
6 more people voted and shorter waiting times if fewer
7 people voted?

8 A. Yes.

9 Q. That's a random factor?

10 A. Okay.

11 Q. Do you agree with that?

12 A. Yes.

13 Q. Okay. How about the amount of effort put
14 into getting people to go vote by political
15 organizations? Could that be a random factor that
16 could contribute to long lines?

17 A. Yes.

18 Q. Okay. Now, I want to go back to Franklin
19 County and these predictions you made.

20 A. Okay.

21 Q. As I understand it, you made predictions

1 and in all but one, it was the DRE or the booth and
2 then in the other it was the scan machine. I'm not
3 familiar with any elections where the poll workers
4 and registration were the bottleneck.

5 I've heard anecdotal evidence of queues
6 where that was true, but I think it's reasonable in
7 certain election context to assume that the
8 bottleneck is the booth or the DRE.

9 Q. Okay. Have you made any comparisons
10 between the number of poll workers in North Carolina
11 precincts and Franklin County, Ohio or anyplace else
12 that you've worked?

13 A. Yes. I've looked at the Franklin County
14 versus Cuyahoga or Cleveland and I think I was also
15 aware of the Onondaga New York State one, so I think
16 I'm familiar with the poll worker counts in those
17 locations.

18 Q. But you don't know anything about the poll
19 worker counts in North Carolina?

20 A. Right.

21 Q. Okay. Either at early voting or in

1 precincts on election day?

2 A. Correct.

3 Q. And if they -- just to give you a
4 hypothetical, Dr. Allen, let's say you had 17 days of
5 early voting, one precinct worker, and maybe two
6 machines, and then the other alternative is ten days
7 of early voting and this county Board got you to tell
8 them how many poll workers they needed and how many
9 machines they needed.

10 Which one of those hypotheticals would
11 probably result in longer wait times?

12 A. I apologize. I missed the first --
13 beginning of your question. Would you repeat it,
14 please?

15 Q. Okay. I'm trying to make the point that
16 the number of days of voting doesn't necessarily
17 equate to waiting times, okay, so let's give you two
18 extreme hypotheticals.

19 Hypothetical Number 1, you've got 17 days
20 of early voting, you've got one precinct worker, and
21 you've got two machines in the precinct, okay.

1 The other hypothetical is you've got ten
2 days of early voting and this county Board of
3 Elections has asked Dr. Allen to tell them how many
4 machines and how many poll workers they need to have
5 at the early voting site or the precinct.

6 Which one of those would be more likely to
7 have a long waiting line?

8 A. The one with very few machines and very
9 few poll workers.

10 Q. Okay. Does your report -- did Ohio have
11 same-day registration in 2004?

12 A. No.

13 Q. Okay. Does your report look at how much
14 time is spent at early voting sites having people
15 complete forms and provide the documents needed for
16 same-day registration?

17 A. No.

18 Q. If same-day registration no longer was
19 available during early voting, would that not tend to
20 mean that the wait times might be reduced if that
21 function didn't have to be performed?

1 A. So you're asking my opinion right now to
2 speculate on that issue?

3 Q. No. I'm just asking you to -- yes, if you
4 want to speculate on it, but I just want to know what
5 your answer is.

6 If you took away same-day registration and
7 people didn't have to fill out a registration form
8 and provide documents, do you think that might make
9 the wait time shorter?

10 A. Well, let me answer that. I don't mean to
11 be confrontational, but let me just say that the
12 person who was not able to register and can't vote
13 has infinite waiting time, so in a sense, no.

14 I mean -- so in other words, let's say you
15 want to go and vote, you were intending to, but then
16 you're not allowed to vote; in a sense, you have to
17 wait four years or two years to vote -- so you see
18 what I'm -- I don't mean to be an -- but if your
19 point is, if an activity creates longer service
20 times, will that increase voting times on average?

21 Yes, I agree with that.

1 Q. So removing same-day registration as part
2 of the process during early voting could result in
3 shorter waiting times in North Carolina?

4 A. For the people who do finally vote. For
5 the people who feel or are unable to vote because
6 they lost the opportunity the one time when they
7 could vote or whatever, those people experience
8 really long waiting times.

9 And if you average them in, it's quite --
10 so the answer is yes and no.

11 Q. But if those people could vote -- they
12 could register 25 days before the election under
13 North Carolina Law, could they not?

14 MR. HO: Objection.

15 THE WITNESS: Yeah, you're speculating.
16 Who knows. Maybe they turned of age at a certain
17 time. There could be hypotheticals in which they
18 were only able to register and they lost the
19 opportunity.

20 BY MR. FARR:

21 Q. Do you know what the North Carolina Law is

1 on when a 17-year-old or 19-year-old can register?

2 MR. HO: Objection.

3 THE WITNESS: I'm unaware of that. I'm
4 sorry.

5 BY MR. FARR:

6 Q. Okay. And so just strictly for the people
7 who are showing up to vote during early voting, if
8 you eliminated same-day registration, that would make
9 the wait time for those people shorter?

10 A. Except you're saying taking the people out
11 who were trying to do same-day registration, that
12 would reduce the number of people who were arriving
13 and those people with their long service times would
14 also be gone.

15 So the people who were coming to do
16 same-day registration -- let's ignore them for a
17 minute, but the other people would be positively
18 influenced. Is that your point?

19 Q. They'd have shorter waiting times?

20 A. Yes. I think that's a reasonable
21 assumption.

1 Q. And your report doesn't account for that?

2 A. Right. My report doesn't have a bearing
3 on that issue.

4 Q. Well, you've predicted longer waiting
5 times, but you have not made an adjustment for how
6 waiting times might be reduced because same-day
7 registration has been eliminated?

8 A. My report only concerns -- I mean, if it's
9 important, I could do analysis of early voting
10 periods, but this report, the scope of it right now
11 in its form here, only relates to election day
12 waiting lines, so it doesn't actually relate to the
13 effect on early voting periods.

14 So this report relates to what happens on
15 election day. Increase how much -- the range of
16 increase in the waiting times on election day and a
17 range of people deterred on election day.

18 It actually doesn't include the scope of
19 what you're talking about now. If you want me to
20 speculate that, that's possible.

21 Q. Did Dr. Stewart report on the wait times

1 for early voting? You relied on a table of Dr.
2 Stewart --

3 A. This thing?

4 Q. No. There's a table that Dr. Stewart
5 used. Did you look at his calculations for waiting
6 time during early voting?

7 A. I don't recall that.

8 Q. Okay. So your report does not deal with
9 waiting times during early voting?

10 A. Correct.

11 Q. And, therefore, it does not deal with how
12 -- waiting times for early voting might be reduced by
13 the elimination of same-day registration?

14 A. Right.

15 Q. Okay. I'm looking at page 14 of your
16 report, and you made a comment that Dr. Stewart said
17 there was an average wait time of 13 minutes. It's
18 in paragraph 25.

19 A. Yeah. He was reporting on a survey that
20 was done that he was part of.

21 Q. Okay. Do you know -- does that average

1 A. Right.

2 Q. Was that 13 minutes on election day, 13
3 minutes for early voting, or a combination of early
4 voting and election day?

5 A. A combination.

6 Q. Okay. So you're -- you base your
7 calculations on an average wait time of 13 minutes?

8 A. Right.

9 Q. And you are only predicting -- you don't
10 know what the average wait time was on election day
11 in North Carolina because Dr. Stewart combined early
12 voting and election day?

13 A. I believe that's correct.

14 Q. Okay. So the average wait time on
15 election day could be less than 13 minutes?

16 A. Correct.

17 Q. And do you know whether or not Dr. Stewart
18 has reported whether in North Carolina the average
19 wait times were higher during early voting or higher
20 on election day?

21 A. I'm not -- I don't remember having a

1 report on that issue -- on that issue, him
2 particularly.

3 Q. Okay. So if you were going to calculate
4 only additional wait time for election day, why did
5 you include the average of wait time for election day
6 and early voting? Why didn't you just look at the
7 average wait time in North Carolina for election day?

8 A. Because there's no data on that that's
9 available to me.

10 Q. Okay. But you'll agree that your average
11 wait time -- if the wait time for early voting was
12 longer, your report would -- it relies upon an
13 average that would be skewed to a higher level
14 because the wait time for early voting is included?

15 A. Yes. I mean, it could be. I mean, it
16 could be underestimating it, depending on the
17 results.

18 Q. Well, if the average wait time on early
19 voting was higher, it would be -- your average figure
20 here would be skewed to the higher side because
21 you've included wait time for early voting in

1 calculating the average?

2 A. I agree.

3 Q. And you don't really know what the average
4 wait time was on election day?

5 A. Right.

6 Q. And your information in this area is based
7 upon Dr. Stewart's report, not on your own
8 independent study?

9 A. I had limited questioning of a resident in
10 North Carolina to just gain general familiarity. I
11 also inspected that report that we cited earlier,
12 which was the deposition in a different case.

13 I also am familiar with the CNN hotline
14 data, so I have some other data independent of Dr.
15 Stewart's to confirm that the waiting -- the ballpark
16 and the average waiting times -- approximate average
17 waiting time of people in North Carolina on election
18 day is considerably less than 30 minutes --

19 Q. Okay.

20 A. -- which we had discussed earlier is a
21 long time.

1 voters --

2 THE REPORTER: I'm sorry. .09 or 9.9?

3 MR. FARR: .09.

4 THE REPORTER: Can you repeat your
5 question?

6 BY MR. FARR:

7 Q. Because of the margin error that you've
8 discussed, it's -- there's a possibility that only
9 0.9 percent of the early voters in North Carolina
10 waited more than an hour?

11 A. I believe that.

12 MR. FARR: This is a good time to break
13 for lunch, I think.

14 THE VIDEOGRAPHER: Okay. This concludes
15 Tape 3. We're going off the record at 12:38 p.m.

16 (Whereupon, at 12:38 p.m., a
17 LUNCHEON recess was taken.)

18 - - -

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

20 (1:54 p.m.)

21 Whereupon,

1 Q. Okay. What about if a jurisdiction had a
2 practice that allowed people to vote outside of their
3 normal precinct and had to cast a provisional ballot?
4 Could that increase wait time?

5 A. I apologize. Can you -- what was the --

6 Q. Do you know what a provisional ballot is?

7 A. Yes.

8 Q. Can the casting and handling of
9 provisional ballots increase the wait time in a
10 precinct?

11 A. Hypothetically, yes.

12 Q. Okay. What about if the jurisdiction --
13 some jurisdictions make people vote in their assigned
14 precinct and some jurisdictions let people vote
15 outside of their precinct.

16 Are you aware of that?

17 A. Yes.

18 Q. Okay. Could allowing voters to vote
19 outside of a precinct where they had to cast a
20 provisional ballot -- could that potentially increase
21 the wait time in that precinct?

1 A. Could allowing voters from outside
2 precincts to come into a precinct to vote increase
3 the -- because -- by adding more to the number of
4 people?

5 Q. Yes.

6 A. Yes.

7 Q. Alright. And would the number of hours
8 scheduled for election at a early voting center
9 possibly have an impact on wait time?

10 A. On election day?

11 Q. No, early voting.

12 A. Yes.

13 Q. Okay. Now --

14 A. Let me make a comment, if you don't mind?

15 Q. Sure.

16 A. So when I did the study in 2005 for
17 Franklin County to try and help them understand what
18 had happened in 2004, I investigated many factors
19 that we listed earlier, including some of the ones
20 that you're listing right now.

21 And in that particular election, by doing

1 correct?

2 A. Right.

3 Q. Okay. Your report does not evaluate how
4 eliminating out-of-precinct provisional voting on
5 election day might reduce wait time?

6 A. Not this report. However, I have written
7 reports about the benefits of voting centers and
8 allowing flexibility in the past.

9 Q. Okay. Did you determine what -- analyze
10 whether there were bottlenecks in any precinct or
11 early voting center in North Carolina because of too
12 few poll workers?

13 A. No.

14 Q. Did you determine whether there were any
15 precinct or early voting centers in North Carolina
16 where long lines were caused because they had too few
17 DRE machines or privacy booths for ballots that are
18 scanned?

19 A. Yes. That's what this whole report is
20 mainly focused on is the issue of -- first --

21 Q. I think I asked my question the wrong way.

1 early voting centers in other parts of the county
2 where they hadn't been in the past, isn't it possible
3 that people who voted on election day who -- might
4 now decide to vote during early voting because it was
5 at a more accommodating location?

6 A. Yes.

7 Q. And that could reduce turnout and wait
8 times on election day, right?

9 A. Hypothetically, yes.

10 Q. Okay. Now, I'm going to ask you some
11 stuff I really don't understand from your report.

12 A. Okay.

13 Q. Explain to me this -- the 2 percent rule
14 that you start talking about on page 19.

15 A. Okay. So --

16 Q. I better write this down.

17 A. Intuitively, if you ask us -- we all have
18 something we want. We want to vote or we want to buy
19 a Chipotle sandwich or whatever you call it -- wrap.

20 If you ask us to wait longer and longer,
21 at some point, we'll drop out because the -- whatever

1 it is we're trying to do is not worth it to us. Our
2 time is too valuable.

3 So the question is, how do you measure
4 that relationship between when people will give up
5 searching for what they are trying to get and when
6 they drop out?

7 And so what's interesting and a little bit
8 counter-intuitive to people is in the two elections
9 that I have data for and that data is available for
10 where they had long, long lines were the 2004
11 Franklin County, Columbus -- or Columbus election in
12 Ohio and the 2012 Florida election.

13 In both cases, they had really long lines.
14 And in both cases, the primary -- in my opinion, the
15 primary driver of the lines related to ballot lengths
16 and also ballot length diversity.

17 So what caused the lines to be longer in
18 some places where those places had much longer
19 ballots and -- they didn't allocate for more booths
20 or more resources for those places.

21 So, in other words, the primary driver was

1 not the turnout. And in fact, interestingly enough,
2 the places that had the longest lines and the latest
3 poll closing times actually had some of the lowest
4 turnout. That's because the ballot length was what
5 caused them to have long lines, not the arrival.

6 And that allows you a kind of natural
7 experiment to approximate this relationship between
8 making people wait and having them drop out.

9 And what's interesting -- and I -- since I
10 didn't want anybody to sort of have to trust me, I
11 put the actual data in the report, these two Scatter
12 Plots, so you can just kind of see the relationship,
13 hopefully, with your own eyes and don't have to trust
14 me.

15 And so arguably, the simplest modeling
16 tool that -- and also the most widely used operations
17 research tool and possibly the most widely used
18 statistics tool is regression.

19 And this is the most basic form of that,
20 fitting line, you could call it. And so when you
21 don't have a lot of data and if you can -- you're

1 hoping the line is going to work because, if it does,

2 it's a nice simple model. It makes sense.

3 So in both indications, a line fits this

4 data. So what these charts show, Exhibit E and

5 Exhibit F -- what they both show is that the

6 locations that have the latest poll closing time

7 actually had the lowest turnout on average.

8 And so this line, which you could just get

9 MicroSoft Excel to fit or almost any kind of software

10 will fit a line to data, this regression line -- what

11 it shows is that on average, as the poll closing time

12 is increased by an hour, you get about a 2 percent

13 reduction in the turnout.

14 And so it provides really, in my opinion,

15 a helpful way to approximately estimate this

16 phenomenon that we're all expecting that's, in my

17 opinion, quite intuitive of people giving up after --

18 a fraction of people giving up after they're pushed

19 to wait.

20 Q. Okay. I have a few questions to ask about

21 this.

1 just having signs so that people don't read the
2 ballot while they're in the booth, that would have
3 helped.

4 There's a lot of things you could do. You
5 know, failure has many fathers, I guess you could
6 say, and so it's not -- now, the reason why I
7 emphasize ballot length was because it's helpful in
8 developing this 2 percent rule.

9 That the locations which had the longest
10 lines were the ones with the highest ballots -- with
11 the longest ballots, and that's because a lot of
12 people aren't listening to us operations researchers
13 or industrial engineers, which they should, in my
14 opinion, and be careful when they allocate machines.

15 They should take the ballot lengths into
16 account. These ballots are much longer than people
17 think and they're much more variable than people
18 think.

19 Q. Okay. And you said the ballots in
20 Franklin County and Florida were longer than the
21 North Carolina ballots?

1 A. Definitely.

2 Q. Okay. And the long ballots were the thing
3 that you relied upon to form your 2 percent rule?

4 A. Right.

5 Q. Okay. Let's look at Exhibit E. I want
6 you to explain this to me because I don't quite
7 understand it.

8 The perpendicular line, is that -- does
9 that mean the turnout of registered voters when it
10 says 100 percent at 80 percent and 40 percent and
11 zero percent on the left-hand side?

12 A. Yes.

13 Q. So the perpendicular line is discussing
14 percentage --

15 A. Of eligible voters. In this case, there
16 were no people who -- in Exhibit E, there was no one
17 who had voted earlier because there was no early
18 voting in that time, but in the other one, there was
19 early voting, so it's the percent of eligible voters.

20 In both cases, it's the percent eligible.

21 Q. Right. In Exhibit E, you're talking about

1 How in the world can you compare lower turnout in a
2 precinct and say that's because of long lines if the
3 lower turnout precinct has a history of having lower
4 turnout?

5 THE VIDEOGRAPHER: Sorry. We have about
6 four minutes left on the tape.

7 THE WITNESS: Okay. Could you repeat what
8 you said, please?

9 BY MR. FARR:

10 Q. Well, can it be possible that the lower
11 turnout is not because of long lines, but it's
12 because there's a lower historical turnout rate in a
13 particular precinct?

14 A. Yeah. There's noise and there's noise
15 around this line, and one of the sources of that
16 noise has to do with the native propensity of people
17 in different locations, sure.

18 But I want to make this clear that this
19 line is quite predictive. It's intuitive. It
20 follows standard practice fitting regression models.
21 It's parsimonious. In other words, it's simple. It

1 makes sense.

2 We know that -- I mean, I feel pretty
3 confident having been paid to analyze the exact issue
4 for the earlier -- Exhibit E that there was no
5 republicans out to get anybody in that election.

6 It was simply -- in 2004, what caused
7 these lines and what caused the discrimination in
8 Franklin County, in my strong opinion, was not any
9 partisan issue.

10 It was simply the failure to account for
11 variable ballot length in that election in doing the
12 allocation, and it wasn't intentional --

13 Q. It wouldn't have been --

14 A. -- at least I don't know it was.

15 Q. Sorry. Wouldn't it have been good to look
16 at the turnout in a particular precinct over a number
17 of elections to see how that turnout changed?

18 A. I did. That's what I'm telling you.

19 Q. Okay. And that's in the Chance report?

20 A. Right.

21 Q. Okay. Well, we'll take a look at that.

1 Q. Alright, Dr. Allen, but let's just go back
2 and make sure I understand what you're saying.

3 This queuing model on page 23, it's based
4 upon the same chart that you've got on page 16 for
5 the turnout in 2012?

6 A. Yes.

7 Q. Okay. And so you don't have a similar
8 chart for turnout in 2010 for early vote usage?

9 A. Not in this report.

10 Q. Right. And you didn't include that in
11 this report?

12 A. Right.

13 Q. So your scenarios in Exhibit G apply to
14 data from a presidential year election?

15 A. I mean, approximately, yes, but it's not
16 to any presidential election. Certainly, it's to the
17 2012 presidential election.

18 Q. Right. It applies to the 2012
19 presidential election in North Carolina?

20 A. Right, hypothetically.

21 Q. Okay. And you didn't in this report do a

1 chart similar to what's on page 16 using the 2010
2 off-year election to make the same type of
3 calculations for 2 -- based upon 2010 that you have
4 in Exhibit G for the 2012 presidential election?

5 A. Right.

6 Q. Okay. Okay. Alright. Now, the wait time
7 you're using in this chart is the 13 percent average
8 wait time that Dr. Stewart used; is that correct?

9 A. Yes.

10 Q. And that includes the wait time that Dr.
11 Stewart reported for early voting as part of the
12 average?

13 A. Right, because there was no pure number
14 that we could use.

15 Q. Right. And do you know what percentage of
16 the voters in 2012 voted during early voting as
17 compared to election day?

18 A. Right now, no, but it's not hard to find
19 out.

20 Q. Okay. But you didn't weight that average
21 to take into account that -- well, let me represent

1 worst case, we have 52 percent of the people, in
2 addition to what normally showed up or what did show
3 up on election day.

4 Now they're showing up, because every
5 single one of the ones who is no longer allowed to
6 vote when they originally wanted to vote or were
7 selected to vote now votes on election day.

8 Then it would be, we have a lot more
9 people arriving per hour at that location. The
10 waiting line would now be -- the average waiting time
11 would now be three hours.

12 Then we would have 6 percent deterred by
13 the 2 percent rule. These are approximate, but it
14 gives us an indication.

15 Then if 6 percent of people who were
16 eligible were deterred, you multiply that by the 3.8
17 million. That's 230,000.

18 Q. Multiply 3.8 million by 6 percent?

19 A. Yes. I hope I did that right. I think I
20 did that right.

21 Q. Alright. Let me ask you a question about

1 that. Do you know -- did you study how many
2 precincts in North Carolina in 2010 had more
3 registered voters in the voting age population?

4 A. No.

5 Q. Okay. Would that possibly be an
6 indication that the registered -- the total
7 registered voters was inflated?

8 A. Yes.

9 Q. Okay. Did you look to see if the --

10 A. I mean, if it happened, sure.

11 Q. Well, it happened. There's an expert
12 report on that.

13 A. Okay.

14 Q. Did you look to see of that 3,842,873
15 voters -- did you check to see how many of those
16 people hadn't voted in the last five presidential
17 elections?

18 A. No.

19 Q. Okay. But did you check to see how many
20 of them had never voted at all?

21 A. I slightly dispute the premise of your

1 question. No offense. Did I check to see? I asked
2 for a lot of data that I didn't get.

3 I mean, you're implying that I'm not being
4 careful. No offense. Maybe I'm just taking this too
5 personally or something, but I would love to check a
6 lot of things that I was unable to check because I
7 didn't have the data to check it.

8 So that's partly why I created in this
9 report what I consider to be really simple models to
10 try and give an indication.

11 And these models, you know, have --
12 there's uncertainty about aspects of them, but
13 they're not designed to give highly accurate
14 predictions.

15 Q. Okay. But wouldn't it affect your
16 calculation if out of that 3,842,873 voters -- some
17 of those people have never voted before? Would that
18 impact your calculations?

19 A. So I think what you're saying is that --
20 maybe what you're saying is that some of these people
21 are extremely unlikely to vote, right?

1 And so that's why in some of the work I've
2 done we've used likely voters instead of registered
3 voters.

4 Q. But you used the entire registered voter
5 database and you didn't deduct for the number of
6 people who never voted?

7 A. Right, but the reason I did that was
8 because -- in the work we did in establishing the 2
9 percent rule, it was also based on the entire
10 registered voter database of Florida and Ohio, so I
11 was trying to be consistent.

12 Now, you're right. I want to point out
13 that I've experienced in my work with Ohio that the
14 registered population has changed sometimes over time
15 as they do different cleaning of that database.

16 There really are issues in the register
17 because so many Americans are moving around, and so
18 it could be that the -- it could be, theoretically,
19 not that I have any information about this, that
20 North Carolina is in a different state than -- I
21 mean, not a different state -- in a different

1 situation -- no pun intended -- than the databases in
2 2004 in Ohio and the database in 2012 in Florida.

3 Q. Okay. So like in Florida and Ohio and
4 North Carolina, on these tests you ran, did you try
5 to determine how many precincts in any of those
6 states had more registered voters in the voting age
7 population?

8 A. I have looked at the voting age population
9 in the past, but I haven't -- I didn't study that in
10 this context.

11 Q. Yeah. I mean, it was a simple question.
12 When you did your test, did you make an adjustment
13 for precincts where the registered voter population
14 exceeded the voting age population, either in Ohio or
15 Florida?

16 A. I apologize, no. I didn't make any
17 adjustment like that.

18 Q. Okay. And in Ohio or Florida or North
19 Carolina, did you make an adjustment for registered
20 voters who have never voted?

21 A. No.

1 Q. Okay. And in Ohio, Florida, and North
2 Carolina, did you make any adjustment for voters who
3 haven't voted in the last two or three presidential
4 elections?

5 A. No.

6 Q. Did you make any adjustment for voters
7 that haven't voted in the last four or five
8 presidential elections?

9 A. No, but let me make a comment about that.
10 In my work with Franklin County, I have analyzed -- I
11 have input to the process of cleaning the voter
12 registration database, and I'm familiar with that and
13 that process and the issues associated with this.

14 And my work in these capacities has caused
15 me to feel that those issues could be important, but
16 they're secondary generally compared to the bigger
17 issues such as turnout.

18 I mean such as -- such as the general
19 effect of having more people turn -- because -- all
20 the people who -- all that 52 percent of people that
21 -- those are real people. Those were not -- those

1 are people who voted on those days that are now
2 eliminated.

3 There's nothing squirrely about those
4 people. They did vote, so they're demonstrated
5 people, and so I see what you're saying. If the
6 registration database is inflated, that would -- that
7 would -- that wouldn't necessarily change a good part
8 of this analysis, but it could change this last
9 column. That's your point?

10 Q. No. I have -- I have several points that
11 I'd like to make.

12 A. Okay. I apologize for presuming that.

13 Q. Okay. So I understand you've looked at
14 the voting age population in other context.

15 A. Right.

16 Q. But in making these tests for Ohio and
17 Florida and North Carolina -- this is just yes or no
18 -- you didn't account for people who never voted on
19 the registered voter list?

20 A. Yes, I didn't.

21 Q. Okay. And you never accounted for people

1 who haven't voted in the last two or three
2 presidential elections?

3 A. Yes, I didn't.

4 Q. And you didn't account for people who
5 haven't voted in the last five presidential
6 elections?

7 A. Yes, I didn't.

8 Q. And would that not indicate to you that
9 perhaps some people decided not to vote for reasons,
10 other than long lines at a precinct?

11 A. Oh, yeah. There's a lot of other issues.

12 MR. FARR: I'd like to mark a final
13 exhibit. What number are we up to?

14 THE REPORTER: 136.

15 (Exhibit Number 136 was marked for
16 identification and was attached to the deposition.)

17 BY MR. FARR:

18 Q. Dr. Allen, take your time to read through
19 that exhibit and let me know when you're done.

20 A. Okay.

21 THE VIDEOGRAPHER: We have about five

1 Q. Okay. Without giving you legal advice,
2 there's a procedure by which folks that are retained
3 as experts, like yourself, and others in this case,
4 when they are -- go to trial -- when the matter goes
5 to trial or a hearing, then the party that purports
6 to use your testimony to support their case puts you
7 up and then has to -- you have to be -- in order to
8 render opinions in court that go into evidence, you
9 have to be qualified as an expert by the court.

10 MR. BOWERS: Is that close enough?

11 THE WITNESS: I gave them a report like
12 this one, but that doesn't necessarily mean I was
13 qualified?

14 BY MR. BOWERS:

15 Q. Correct. So what I'm asking you is: Have
16 you ever been qualified as an expert by a court based
17 on the description I just gave you?

18 A. I would say, no --

19 Q. Okay.

20 A. -- from what you just told me.

21 Q. Okay. Let me ask you this: Would you

1 describe yourself as a Democrat?

2 A. Yes.

3 Q. Okay. Have you contributed to candidates
4 campaigns in the past?

5 MR. HO: Objection.

6 BY MR. BOWERS:

7 Q. You can answer.

8 A. Yes.

9 Q. Give me a representative sample of
10 candidates to whom you've made contributions.

11 A. President Obama, Al Gore, several
12 senatorial committees. Is that all?

13 Q. No John Kerry?

14 A. Sure. I probably gave him money, too.
15 No. I definitely gave him money, also, but let me
16 also make another comment.

17 FYI, in my election work, I've mostly
18 worked for the Republicans, and there's a guy in Ohio
19 that I think works with Secretary -- Senator --
20 Secretary Husted.

21 The number one guy under Husted for voting

1 is a Republican who I regard as a close ally and
2 major source of information.

3 Q. Who is Husted?

4 A. Husted is our Secretary of State in Ohio,
5 and this guy's name is Matthew Damschroder. So, you
6 know, honestly, the truth is that election officials
7 are a pretty simple system.

8 I, honestly, regard it as kind of fixing
9 something broken, like a toilet or something, and
10 trying to help people fix it. It's not, honestly, a
11 partisan issue for me at all. I can honestly say
12 that. I hope that helps.

13 Q. It does. Have you ever contributed to a
14 federal Republican candidate?

15 A. I would say -- I don't know. Let me think
16 about that. Honestly, it's possible. A federal
17 Republican candidate?

18 Q. Yes.

19 A. I would say no --

20 Q. Okay.

21 A. -- although there are some Republicans

1 and point out the ones that are speculative.

2 A. So the first one, 42, I'm good. There's
3 nothing speculative about it.

4 (Unintelligible.)

5 THE REPORTER: Excuse me.

6 THE WITNESS: Oh, okay. I'm sorry.

7 By MR. BOWERS:

8 Q. She's got to take all of this down. I
9 know you're a rookie and you're doing great, but
10 speak so she can hear you, please.

11 A. Okay. I'm reading Number 3 now. "I
12 conclude that eliminating seven days of early voting
13 would have caused waiting times to vote to increase
14 significantly."

15 I'd say there's some speculative aspect of
16 that, although I think it's likely true.

17 THE VIDEOGRAPHER: We have about five
18 minutes left on this tape.

19 THE WITNESS: So that's an example of
20 something that is slightly speculative. Then I'm
21 just going to skip to the end of this one.

1 "In a worst-case scenario, there would
2 have been three-hour waits." I think that's not
3 speculative because the worst case would be all of
4 those people shifted to election day, as I've defined
5 the worst case, so I don't think that's speculative.

6 I mean, you could say the case is
7 speculative, but --

8 THE REPORTER: I'm sorry?

9 THE WITNESS: But I'm saying that if all
10 the people who voted during the eliminated days
11 switched to election day -- so with that
12 qualification, then this statement holds, I think.

13 BY MR. BOWERS:

14 Q. Let me investigate that statement just
15 real quickly.

16 The notion that all of those people vote
17 on election day, that's purely speculative, is it
18 not?

19 A. I don't know what you're talking -- I
20 mean, speculative is --

21 Q. You don't know -- what knowledge do you

1 questions for you to follow up on some of the
2 questions that were asked earlier today.

3 Do you remember when Mr. Farr asked you
4 about some of the other provisions in the law at
5 issue? And I'm referring to same-day registration
6 and out-of-precinct voting.

7 A. Yes.

8 Q. Are you aware that North Carolina has
9 never had same-day registration on election day, but
10 only during early voting?

11 A. Yes.

12 Q. That being the case, will the elimination
13 of same-day registration affect waiting times on
14 election day?

15 A. I would say probably not.

16 Q. Are you offering any opinion on whether of
17 -- the elimination of same-day registration will
18 affect average waiting times to vote in North
19 Carolina during the early voting period?

20 A. There's no -- the report contains no
21 statements relating to that issue.

1 Q. And are you offering any opinion on that
2 today outside of your report?

3 A. I haven't and I don't intend to.

4 Q. Mr. Farr asked you about out-of-precinct
5 voting and he asked you what might happen if a voter
6 shows up at the wrong precinct.

7 My question is: What happens when a voter
8 doesn't show up at his or her correct precinct? What
9 effect, if any, would that have on waiting times at
10 that precinct?

11 A. So if they don't show up at their correct
12 precinct --

13 Q. But they go somewhere else.

14 A. -- and they go somewhere else? See, in
15 Ohio if you do that, you are relegated to voting
16 provisionally, so you kind of go on a separate queue
17 or a separate system.

18 I'm not totally knowledgeable, but if
19 North Carolina were the same way, then it would have
20 minimal effect.

21 Q. Today, are you offering any opinion on

1 whether the elimination of out-of-precinct voting
2 will affect average waiting times to vote in North
3 Carolina?

4 A. I apologize. You said the elimination of
5 what?

6 Q. Out-of-precinct voting or the counting of
7 ballots that are cast at an incorrect precinct.
8 That's what I mean by that.

9 A. Yeah.

10 Q. Are you offering any opinion on whether
11 the elimination of that practice will affect average
12 waiting times to vote in North Carolina?

13 A. I haven't considered that issue, but -- so
14 I haven't offered an opinion on that. There's no
15 opinion about that in the report.

16 Q. And are you offering one today outside of
17 the report?

18 A. I could if you want me to, but I haven't
19 offered one.

20 My opinion is that -- do you want my
21 opinion?

1 plan not to use that while I communicate with people,
2 except for certain communities.

3 Q. I just want to get to something else Mr.
4 Farr asked about. He asked about the way that you
5 used poll closing times in Franklin County Ohio.

6 Do you remember that?

7 A. Yes.

8 Q. And you said something about how people
9 who waited to vote around poll closing were in the
10 95th percentile?

11 A. Yes.

12 Q. What did you mean by that?

13 A. I regret that, to some extent. I think
14 that's an approximate indication, in a sense, of what
15 that means.

16 The poll closing time is a statistic that
17 our simulations can generate, just like our
18 simulations can generate an estimate for the 95th
19 percentile voting person.

20 They can also generate predictions for the
21 mean or average voting waiting time, so it is a

1 statistic.

2 Is it the same as the 95th percentile?

3 No. Is it similar, in some sense, approximately
4 similar? In some situations, under some assumptions,
5 yes.

6 Q. Your queuing equations that we've been
7 talking about here, do they predict waiting times at
8 the 95th percentile?

9 A. No. One of the limitations of steady
10 state queuing theory, which is what we used or the
11 most vanilla models -- one of the limitations of
12 these models is that they tend to focus on average
13 performance, not worst-case performance or 95th
14 percentile performance.

15 Q. So if we turn to page 18 of your report
16 and Exhibit D, the table at the top there, you used
17 your queuing equations to arrive at these numbers?

18 A. Yes.

19 Q. Are these predictions from your queuing
20 models the 95th percentile?

21 A. No. They're predictions for the average.

1 A. Right.

2 Q. Did you account for that factor, number of
3 voters, in this report when you looked at North
4 Carolina?

5 A. Yes.

6 Q. You mentioned ballot length. Why is
7 ballot length important?

8 A. Because it drives the service time
9 distribution.

10 Q. Did you look at service time here when you
11 generated your predictions for North Carolina?

12 A. Yes.

13 Q. Mr. Farr asked you some questions about
14 data that you wanted from North Carolina?

15 A. Right.

16 Q. Among the kinds of data that you wanted
17 from North Carolina, did you want information about
18 the number and type of voting machines used?

19 A. Yes.

20 Q. What is your understanding about whether
21 that information was provided by North Carolina?

1 A. My understanding that that particular
2 piece of information was only derived in a limited
3 way by our own investigations.

4 Q. What's your understanding about whether it
5 was provided by North Carolina?

6 A. I don't think it was provided.

7 Q. Did you also want information about poll
8 closing times in North Carolina?

9 A. Yes.

10 Q. What is your understanding about whether
11 that information was provided by North Carolina?

12 A. My understanding is that it was not
13 provided.

14 Q. Did you want information about the
15 timestamps on the last ballot casts at precincts in
16 North Carolina?

17 A. My information was that it was not
18 provided.

19 Q. Does the absence of that information alter
20 the opinions in your report today?

21 A. Hypothetically -- hypothetically, it

1 could, but I still feel that the conclusions are
2 defensible and helpful.

3 Q. Mr. Farr asked you some questions about a
4 sample ballot from Florida.

5 Do you remember that?

6 A. Yes.

7 Q. Is the length of this ballot, in your
8 understanding, the only cause of long lines to vote
9 in Florida in 2012?

10 A. No.

11 Q. What are some other causes?

12 A. More people could have voted early. There
13 could have been better voter preparation. They could
14 have used machines that are easier to vote on instead
15 of mostly booths -- almost all booths.

16 They could have -- they could have done
17 more voter education earlier in terms of making it
18 easier to vote, so -- and they could have run the
19 queues possibly better.

20 I heard that in some places the queues
21 were run smartly and other cases they were not run

1 smartly.

2 Q. I want to ask you some questions about
3 when you talked to Mr. Farr about a representative
4 precinct in North Carolina.

5 Why did you build a picture of a
6 representative precinct in North Carolina?

7 A. Well, my goal was to create, using the
8 available information that we had, the simplest and
9 most transparent, but yet predictive and powerful,
10 approximate prediction system.

11 Q. So I want to turn to page 14 of your
12 report. And if we could, look at paragraph 26.

13 This first sentence: "Using Equation 2
14 then allows us to create a picture of a typical
15 voting location in North Carolina in 2012?"

16 A. Right.

17 Q. And in this paragraph, you give some
18 values for this typical polling location, 100 people
19 arriving per hour?

20 A. Right.

21 Q. Seven voting machines; is that right?

1 A. Correct.

2 Q. Average service time of 4.035 minutes?

3 A. Um-hum.

4 Q. For the purposes of your analysis of the
5 effect of switching voters from election -- sorry.

6 For purposes of your analysis of the
7 possible effect of switching voters from early voting
8 to election day, do the precise numbers that you use
9 in this paragraph for a typical precinct -- do they
10 affect your conclusion?

11 A. Minimally. They do affect it. The exact
12 ranges will change because we shift it up or down
13 just like that 13-minute number could shift the
14 ranges up or down, but the qualitative aspect of the
15 recommendations and the intersection of this model
16 with the 2 percent rule would not change it
17 substantively.

18 Q. You mentioned the 13-minute average
19 waiting times that you use in this report that Mr.
20 Farr asked you about.

21 If average waiting times on election day

1 in North Carolina were less than 13 minutes, would
2 that affect the nature of the opinions you offer in
3 this report?

4 A. It could if they were much less, but if
5 they were, say, for example, eight minutes or six
6 minutes, it wouldn't -- it would change the
7 estimates, but not the basic opinions.

8 Q. When you estimated -- so turn back to
9 where we were earlier, page 18, Exhibit D.

10 When you ran through your predictions
11 here, in the different scenarios that you considered,
12 what happened to waiting times to vote, if anything?

13 A. They generally went up and quite
14 substantially.

15 Q. In any scenarios, did adding voters from
16 the early voting period to election day result in a
17 decrease in waiting times?

18 A. Not -- we're predicting the average
19 waiting times, and, no, it didn't.

20 They could theoretically result in an
21 instance where voting times were less, but not on

1 average.

2 Q. So what happened to average waiting times
3 in every scenario that you considered?

4 A. They all went up.

5 Q. I want to ask about the 2 percent rule
6 that Mr. Farr asked you about.

7 A. Um-hum.

8 Q. Could you just explain, again, the 2
9 percent rule, what it means?

10 A. Yes. So we all know that in some extreme
11 or if you ask people to wait, they will drop out, so
12 if anybody -- we can imagine, hypothetically, that if
13 we asked people to wait for 1,000 hours that we might
14 have almost nobody voting.

15 So the question is, how does that
16 relationship work and how does it work on the scale
17 of hours?

18 So these two natural, what you might call,
19 experiments in cases where there were very long lines
20 provided me a method to estimate -- provided us all a
21 method to estimate how people are deterred, how much.

1 And --

2 Q. So let me stop you there and just ask you
3 a question -- or qualification about what you said a
4 moment ago.

5 You said "it's a measure of a relationship
6 between waiting times and people dropping out;" is
7 that right?

8 A. Yes. Um-hum.

9 Q. And did you find there's a relationship?

10 A. Yes.

11 Q. What's that relationship?

12 A. Is that what you're asking? Okay. The
13 relationship is, approximately, every hour you ask a
14 population to wait, 2 percent drop out.

15 Q. Is that relationship between waiting times
16 and people dropping out -- is that dependent upon the
17 exact length of the ballots in the elections that
18 you've studied?

19 A. Not directly, no, because you could --
20 people could be waiting for different reasons.

21 For example, the 2004 election of Franklin

1 County had different ballot lengths than the 2012
2 election in Florida.

3 Q. So I want to return, again, just to your
4 work for Franklin County that you talked about with
5 Mr. Farr.

6 When did you first work for Franklin
7 County?

8 A. 2005, I believe.

9 Q. Do you know, if you know, why Franklin
10 County reached out to you to for them?

11 A. Yes.

12 Q. Why?

13 A. They were sued by this small company for
14 reasons that I was unaware of and then they settled
15 with the company and their settlement was that they
16 would work with an expert on waiting systems.

17 And I was considered an expert on waiting
18 systems, so they worked with me.

19 Q. Was there a problem with waiting before
20 2005 when you started working with them?

21 A. Yes. There was this election where they

1 had those extremely long lines and there was also --

2 Q. After --

3 A. There was also evidence -- significant
4 evidence of discrimination in the nature of the
5 lines.

6 Q. After you worked for Franklin County, did
7 they have the same problems with waiting times?

8 A. No.

9 Q. Between 2004 and 2006, other than you
10 working for Franklin County, were there any
11 significant changes to the voting process in Franklin
12 County?

13 A. Yes.

14 Q. What, if any, were those?

15 A. They doubled the number of machines, but
16 then the machines were twice as slow to vote on.
17 Then they had 30 percent of the people voting early,
18 and they hired me, so they did four changes all at
19 once.

20 And I implemented, with their help,
21 together -- I recommended to them and they

1 implemented an allocation of the machines that put
2 more machines in places with longer ballots.

3 Q. So that's one of the four things?

4 A. Right.

5 Q. The other things were, they bought new
6 machines? You said that.

7 A. Bought new machines --

8 Q. And then the third thing --

9 A. -- twice as many of the machines, 30
10 percent of the people voting early, and what I
11 considered to be a smarter or proper allocation of
12 the machines, all four of those changes.

13 MR. HO: Okay. I don't have any other
14 questions for you, Dr. Allen. Thank you very much.

15 EXAMINATION BY COUNSEL FOR DEFENDANT

16 PATRICK LLOYD MCCRORY

17 BY MR. BOWERS:

18 Q. Dr. Allen, I'm going to follow up on just
19 a few things that Mr. Ho asked you.

20 MR. FARR: And I may have a question or
21 two, depending on whether Butch covers it.