Schrader, USGS (2008)

J-71

1

Defendants' Exhibit
D-202
No. 143, Original

The evidentiary hearing was to be "on the limited — and potentially dispositive — issue of whether the Aquifer is, indeed, an interstate resource." 2016 Op. 1.

Memorandum of Decision on Tennessee's Mot. to Dismiss, Memphis & MLGW's Mot. to Dismiss, & Mississippi's Mot. to Exclude (Aug. 12, 2016) (ECF No. 55) ("2016 Op.")

Middle Claiborne Aquifer is a single, continuous hydrogeologic unit that spans multiple states (Larson)

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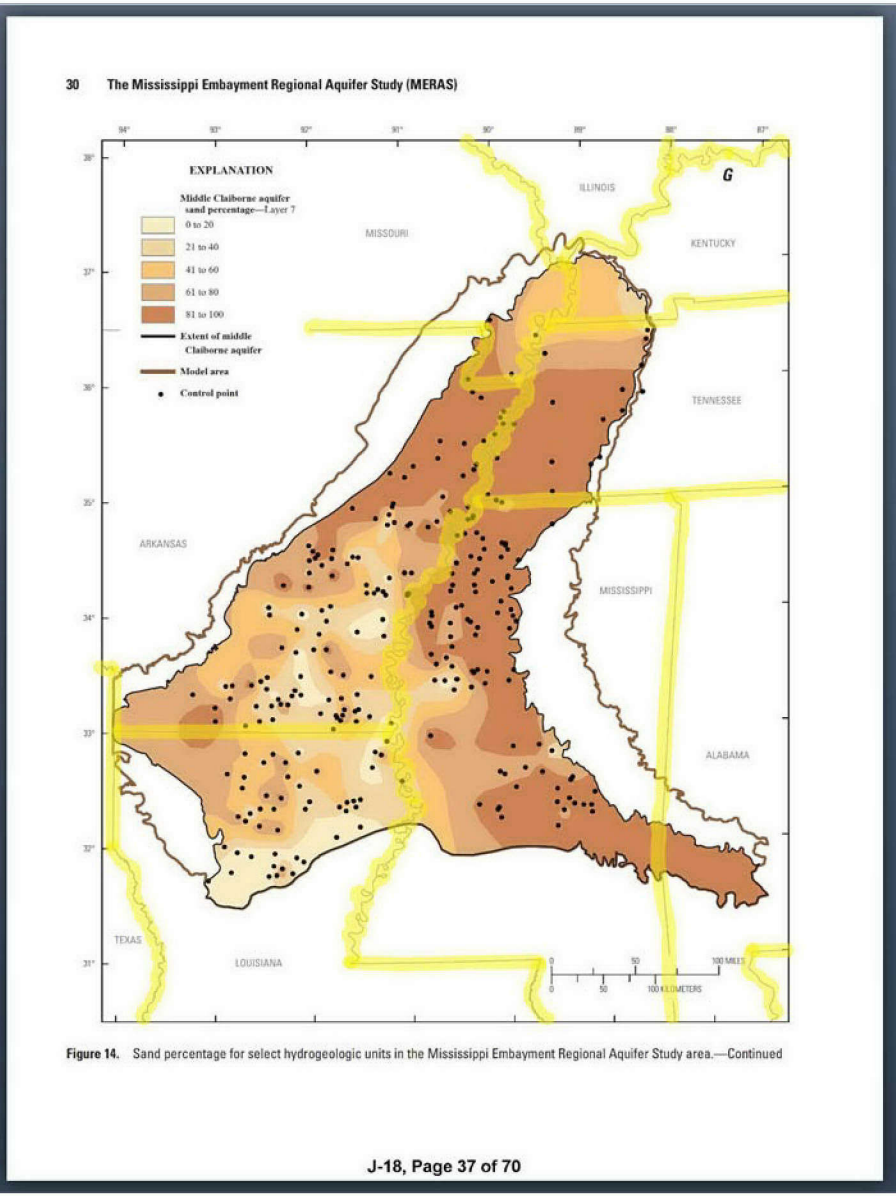
Q. What is that opinion?
A. In my opinion, the Middle Claiborne Aquifer is an interstate water resource.
Q. What are the bases of that opinion?
A. Well, the first one, as I said, is it is a single continuous hydrogeologic unit that spans multiple states; in this case, eight states.

5/22/19 Hrg. Tr. at 589:1-7 (Larson)

Clark & Hart, USGS (2009) Figure 14G



J-18, at pdf 37

Larson:
Variation does not represent a barrier or break in continuity

25 Q. So let's talk about each of these factors. Are the

1 hydrological and geological properties of the Middle Claiborne
2 the same throughout the aquifer?
3 A. No, they're not the same. They'll vary from place to
4 place.
5 Q. And does that -- do those differences affect your
6 conclusion about the hydrogeological continuity?
7 A. No, because they are just reflecting variations in the
8 property that don't represent barriers to safe flow, or the
9 effects of pumping, for example.

Spruill:
"There's no boundary"

23 A There's no boundary that stops the movement of water across
24 the boundary.
25 Q And there's no physical barrier at all that extends

5/22/19 Hrg. Tr. at 598:25-599:9 (Larson)
5/21/19 Hrg. Tr. at 298:23-24 (Spruill)

Brahana & Broshears (2001) Figure 3

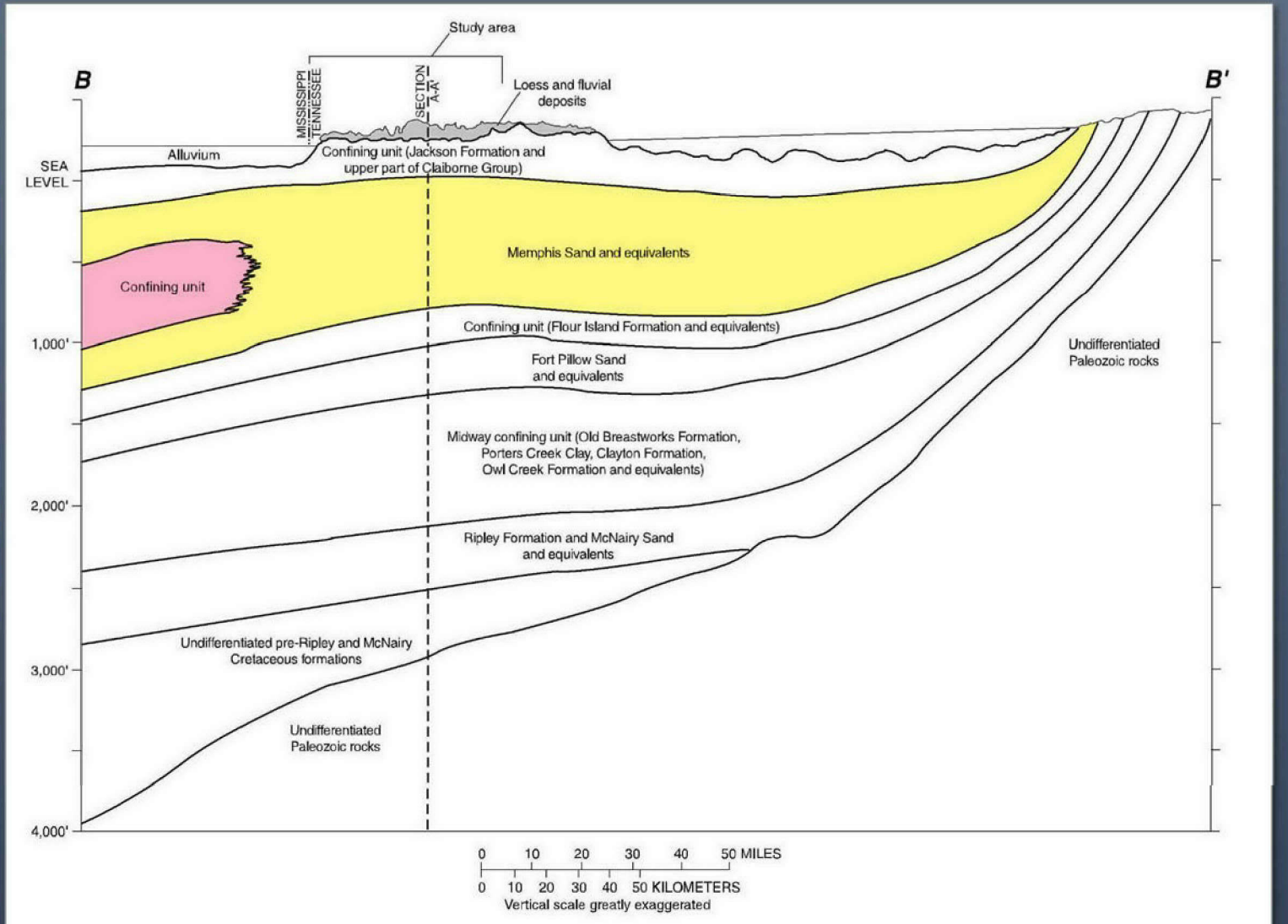


Figure 3. Hydrogeologic section showing principal aquifers and confining units, south to north, through the Mississippi embayment along line B-B′.

J-15, at pdf 15

Pumping effects cross the border in both directions (Spruill)

Q Now, Dr. Spruill, you have opined that pumping out of the Middle Claiborne on the Tennessee side of the state boundary has affected groundwater flow on the Mississippi side of the aquifer, correct?

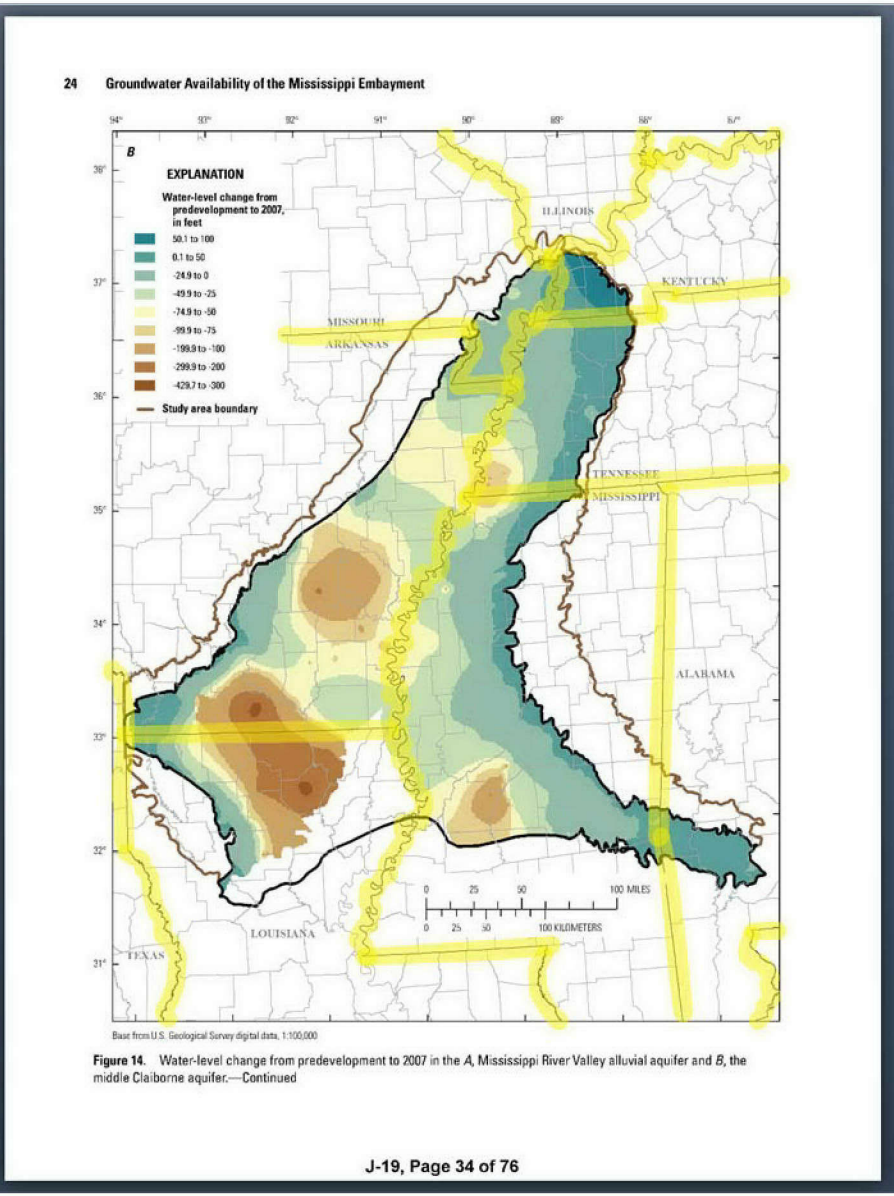
A Correct.

Q Now, you also agree that pumping on the Mississippi side of the Middle Claiborne Aquifer can affect groundwater flow on the Tennessee side of that aquifer, correct?

A Yes.

5/21/19 Hrg. Tr. at 300:2-6, 17-20 (Spruill)

Clark et al., USGS (2011) Figure 14*B*



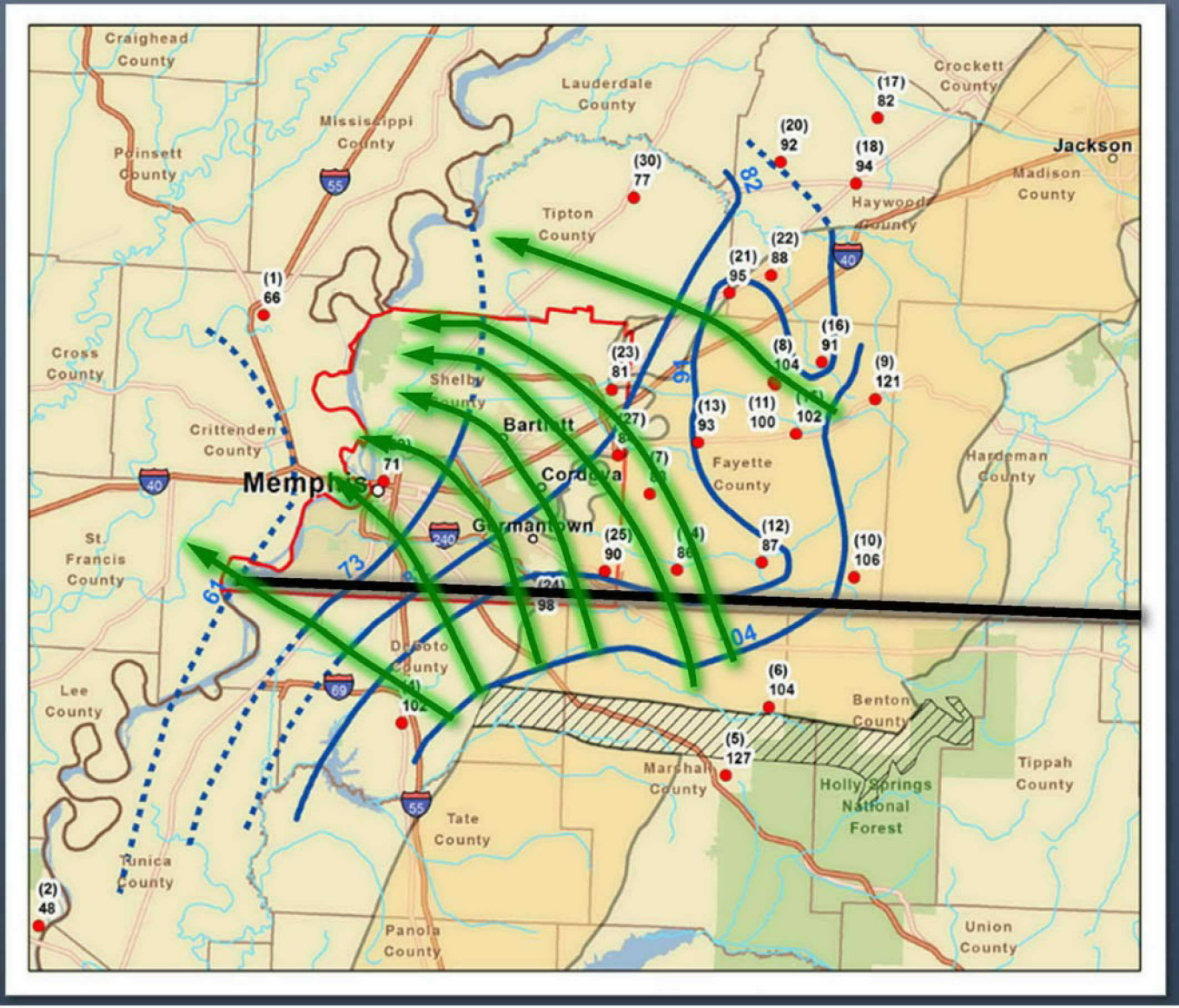
J-19, at pdf 34

Water in the Aquifer is constantly flowing out of Mississippi (Larson)

23	Q. Is water continually flowing out of the State of
24	Mississippi within the Middle Claiborne Aquifer?
25	A. Yes.

5/22/19 Hrg. Tr. at 642:23-25 (Larson)

Waldron & Larsen (2015)
Figure 4



D-174, at pdf 17

Drs. Waldron & Larsen concluded that more water was crossing the border from Mississippi into Tennessee under natural conditions than under postdevelopment conditions

Q. Now, Dr. Waldron, when you compared your estimated predevelopment flow across the border to the postdevelopment cross-border flow estimated by Schrader, what did you find?

A. I found that on average, the volume of water during predevelopment, going from Mississippi into Tennessee, was higher than it was in 2008.

5/23/19 Hrg. Tr. at 853:6-11 (Waldron)

Mississippi's experts could not determine the accuracy of Mississippi's predevelopment maps (Spruill)

7	Q So what you just said, Dr. Spruill, you have no idea if
8	Criner and Parks actually had any other information that they
9	used to justify this bend, do you?
10	A No.

8	Q And without knowing what the data is that may or may not
9	justify these contour lines all along the state border, you as
10	a scientist, you can't opine on their accuracy, can you?
11	A No.

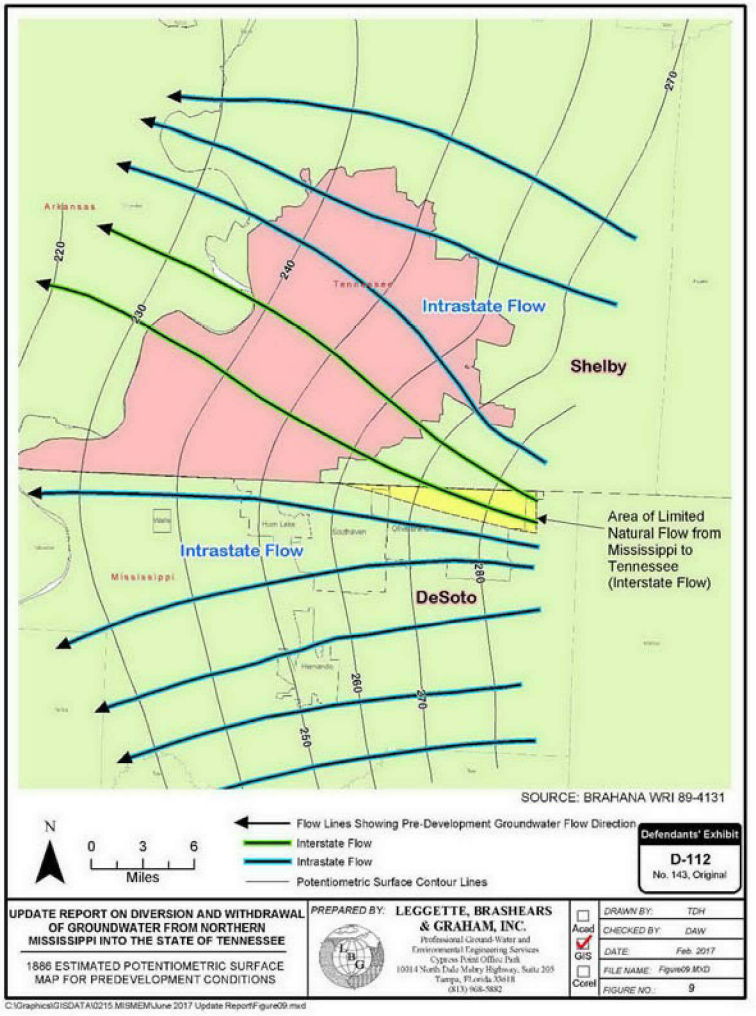
5/21/19 Hrg. Tr. at 346:7-10 (Spruill)
5/21/19 Hrg. Tr. at 347:8-11 (Spruill)

One reason for less flow from Mississippi to Tennessee is Mississippi's increased pumping (Waldron)

Q. So you're saying -- did I understand you correctly that you found that the volume of water flowing from Mississippi into Tennessee has declined since predevelopment?
A. Based upon that average, yes.
Q. And -- but we all know, we've talked about it at length, that MLGW is pumping out of the Middle Claiborne Aquifer. So how does your comparison make any sense?
A. Well, I guess different reasons. One, you know, with the natural flow of water from Mississippi into Tennessee being from southeast to northwest, since that time, Mississippi has put in wells in their municipalities right along the border. So by doing so, they've put in their wells, they're intercepting that flow that would have naturally gone into Tennessee. So that's taking some of that.

5/23/19 Hrg. Tr. at 853:12-25 (Waldron)

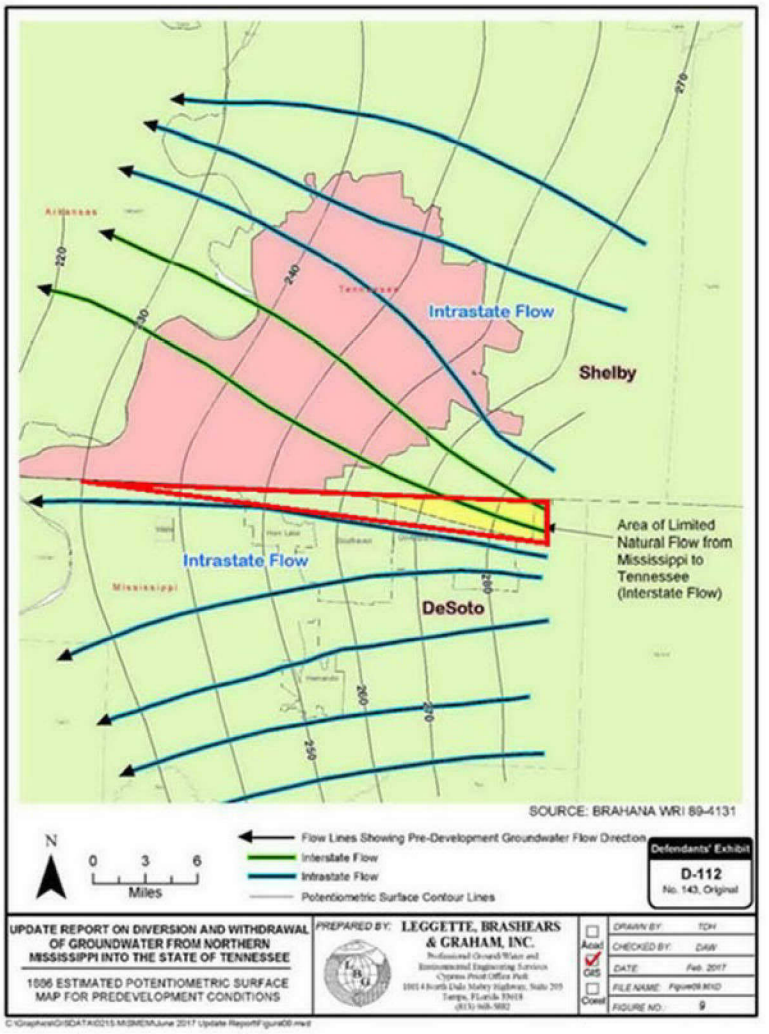
Wiley Report
Figure 9



D-112, Page 1 of 1

D-112

Wiley Report
Figure 9:
With the
triangle
corrected



D-112, Page 1 of 1

37 million gallons per day flowed from Mississippi to other States within the Middle Claiborne Aquifer under predevelopment conditions (Wiley)

Q. So in other words, you thought it was a reliable estimate that under predevelopment conditions, almost 37 million gallons of water was flowing every day from Mississippi into other states?
A. Yes.
Q. And that's all within this aquifer, the Middle Claiborne

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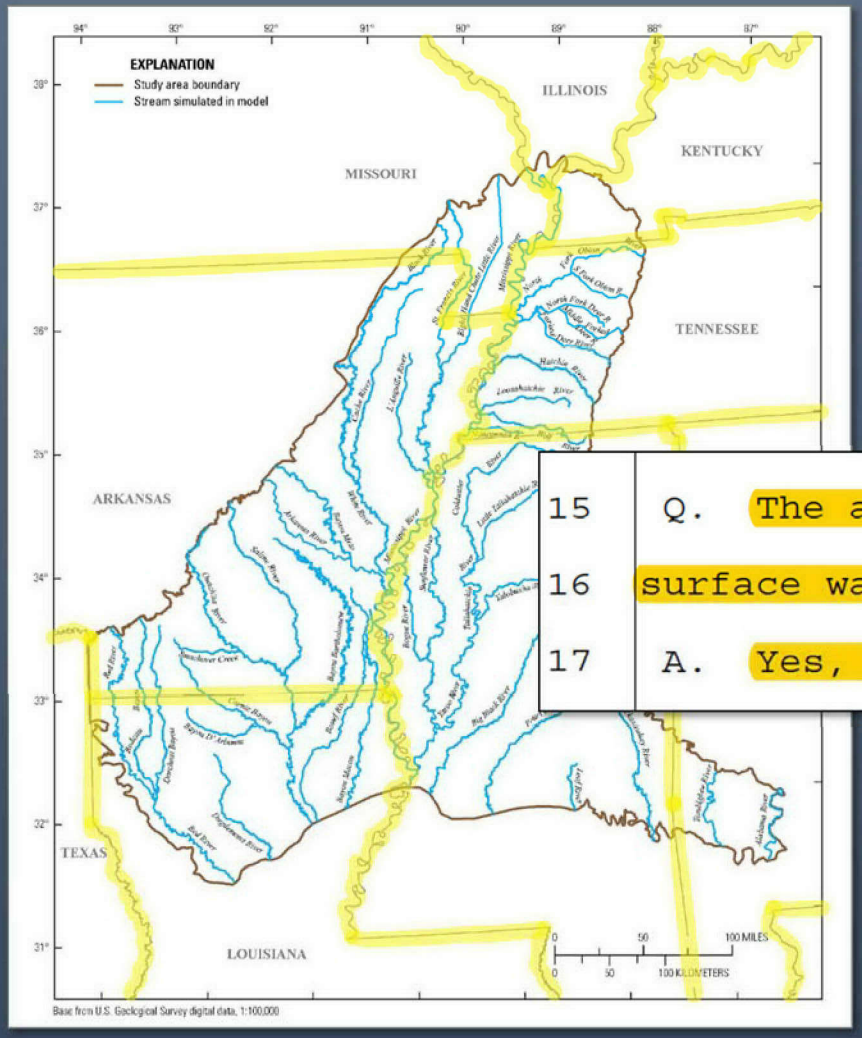
Wiley - cross

Aquifer, correct?
A. Yes.

5/22/19 Hrg. Tr. at 532:20-533:2 (Wiley)



"The aquifer in this case is hydrologically connected to surface water" (Wiley)

15 Q. The aquifer in this case is hydrologically connected to
16 surface water, correct?
17 A. Yes, it is. It's not directly, but through [leakance]*

J-19, at pdf 16; 5/22/19 Hrg. Tr. at 502:15-17 (Wiley)

*Edit by errata

"[T]he Supreme Court has indicated that equitable-apportionment principles govern disputes between States over a body of interstate surface water with a groundwater component." 2016 Op. 20 (citing *Texas v. New Mexico*, 462 U.S. at 556-58 & n.2).

Memorandum of Decision on Tennessee's Mot. to Dismiss, Memphis & MLGW's Mot. to Dismiss, and Mississippi's Mot. to Exclude (Aug. 12, 2016) (ECF No. 55) ("2016 Op.")

Spruill: No Opinion on "Interstate Resource"

state, then, if that's true, the resource is likely interstate

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in nature?
A That's not the definition of an interstate resource.
Q It's not?
A No. I don't know what the definition of an interstate resource is.

THE COURT: Well, I think he kind of beat the around enough. The witness obviously doesn't have an opinion about whether it's interstate or not, so we can go on to another topic.

Wiley: No Opinion on "Interstate Resource"

Q. Mr. Wiley, just to clarify a couple of points. You are not here today to offer any opinion about whether the groundwater

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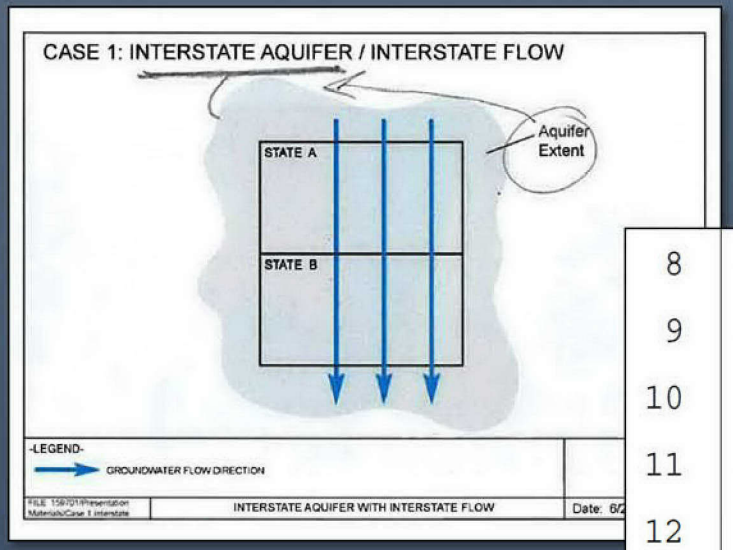
Wiley - cross

resource at issue in this case is an interstate resource; is that correct?
A. That's correct.
Q. And you don't have an opinion about an -- what an interstate resource would be; is that also correct?
A. That's correct.

5/21/19 Hrg. Tr. at 313:25-314:5, 314:17-20 (Spruill)
5/22/19 Hrg. Tr. at 533:24-534:6 (Wiley)

Middle Claiborne Aquifer is an "interstate aquifer" under the definition applied in Mississippi's expert report (Spruill)



Q And you used the word "interstate aquifer" in this figure because the aquifer exists beneath both of these states, correct?

A That's correct.

Q In applying that very same definition of interstate aquifer to this case, the Middle Claiborne Aquifer would be an interstate aquifer because it physically exists beneath multiple states, correct?

A Yes.

5/21/19 Hrg. Tr. at 318:8-16 (Spruill); D-129

Water in the Aquifer is constantly moving and will eventually leave Mississippi

Larson:

18	A. That there is groundwater movement within the Middle
19	Claiborne Aquifer. The water is not static; it's not stored
20	permanently in one place. And it's moving, and it was moving
21	in predevelopment times, and it's moving today, and that that
22	movement takes the water across state boundaries.

Larson:

18	Q. Would all the water in Mississippi in predevelopment
19	conditions stay permanently in Mississippi?
20	A. No, it's moving. So over time it will leave Mississippi.

5	Q And so that means that eventually, over a long enough time
6	horizon, all of the groundwater in the Middle Claiborne beneath
7	Mississippi is going to leave the system, correct?

Spruill:

10	A The answer is yes.

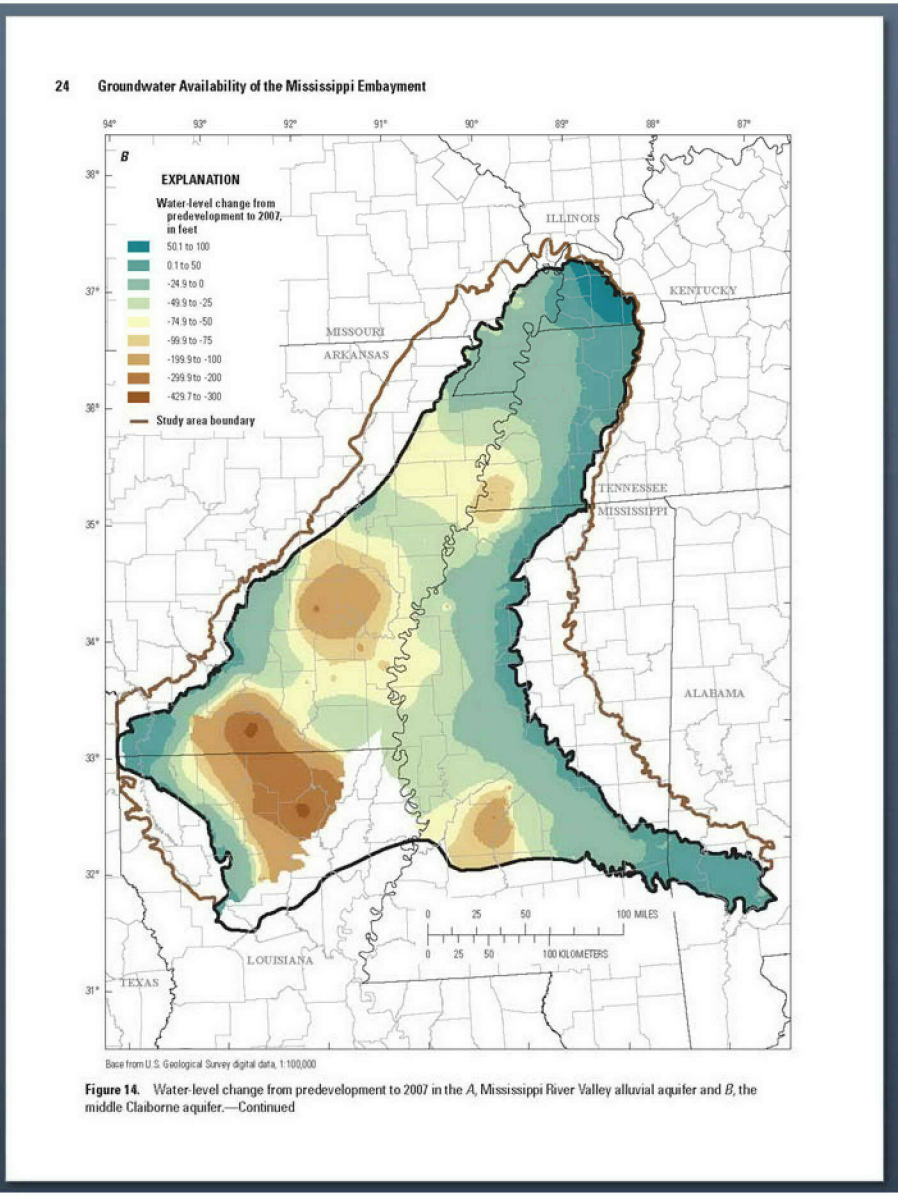
5/22/19 Hrg. Tr. at 621:18-22, 626:18-20 (Larson); 5/21/19 Hrg. Tr. at 307:5-7, 10 (Spruill)

A substantial amount of water flowed from Mississippi to Tennessee in predevelopment conditions (Waldron)

Q. Now, Dr. Waldron, does your predevelopment flow analysis that's in Defendant's Exhibit 174 support your opinion that the Middle Claiborne Aquifer is an interstate aquifer?
A. Yes, it does.
Q. And how so?
A. Because it shows that the water is moving across the political boundary.
Q. Based on your analysis, would you agree with the claim that only a very small amount of water was flowing naturally from Mississippi into Tennessee under natural conditions?
A. No, sir. Based upon the averages that I calculated, it was more substantial.

5/23/19 Hrg. Tr. at 857:4-15 (Waldron)

Clark et al. (2011) Figure 14*B*



J-19, at pdf 34

The cost of Mississippi's suggested "fix" of moving MLGW's wellfields to north of Memphis would be enormous (Spruill)

Q And you don't -- and you agree that, if MLGW were to do what you just said, it would require the design and construction of hundreds of new wells and many miles of pipeline?

A Absolutely.

Q And you agree that the cost would be enormous, correct?

A Yes.

5/21/19 Hrg. Tr. at 332:25-333:6 (Spruill)

Mississippi is consciously avoiding an equitable apportionment, which

requires proving a substantial injury by clear and convincing evidence;

precludes money damages;

requires evaluating the broader regional water system, including scrutinizing Mississippi's pumping;

considers reliance interests; and

could result in Mississippi being worse off than it is now.

Mississippi has had no difficulties increasing its water supply from the Aquifer (Larson)

depression and propagated into Mississippi. As far as I'm aware, water supply users in Mississippi have been able to increase their water supply significantly over the last several decades, and I'm not aware of any difficulties that they're having in terms of obtaining their water supply.

5/22/19 Hrg. Tr. at 648:3-7 (Larson)

Mississippi has sufficient water to meet its demand

Larson:

13	Q. Has Mississippi presented any evidence that you've seen
14	indicating that Mississippi has difficulty increasing its
15	pumping?
16	A. No, I haven't.

Spruill:

6	Q Given current water demand in DeSoto County, water
7	purveyors in Mississippi are currently able to meet demand for
8	water from Mississippi's side from the Middle Claiborne
9	Aquifer, correct?
10	A As far as I know, they are.

5/22/19 Hrg. Tr. at 648:13-16 (Larson)
5/21/19 Hrg. Tr. at 325:6-10 (Spruill)

The Aquifer's water levels have stabilized over the past 20-30 years (Larson)

20	A. The water levels -- the potentiometric level of water
21	levels over the last, say, 20 or 30 years or so have been
22	relatively stable, and have even shown increases in more recent
23	years.

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1	A. That while there was an initial decline, say, prior to the
2	1970s, that a leveling-off would indicate that there's been
3	more of a balance between recharge and discharge, allowing the
4	potentiometric levels to become relatively stable.

5/22/19 Hrg. Tr. at 654:20-23, 655:1-4 (Larson)