No. 143, Original

IN THE
Supreme Court of the United States

STATE OF MISSISSIPPI,
Plaintiff,
v.

STATE OF TENNESSEE, CITY OF MEMPHIS, TENNESSEE, AND MEMPHIS LIGHT, GAS & WATER DIVISION,
Defendants.

On Bill of Complaint
Before the Special Master, Hon. Eugene E. Siler, Jr.

DEFENDANTS' JOINT MOTION TO EXCLUDE THE TESTIMONY OF DR. RICHARD SPRUILL

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MLGW	Memphis Light, Gas & Water Division
Spruill Dep.	Deposition of Richard Spruill, *Mississippi v. Tennessee, et al.*, No. 143, Orig. (Sept. 28, 2017)
Spruill July Rep.	Expert Report Addendum #1 of Richard K. Spruill, Ph.D., P.G. (July 31, 2017)
Spruill June Rep.	Expert Report of Richard K. Spruill, Ph.D., P.G. (June 30, 2017)
USGS	United States Geological Survey
Waldron August Rep.	Sur-Rebuttal Expert Report of Brian Waldron, Ph.D., *Mississippi v. Tennessee, et al.*, No. 143, Orig. (Aug. 30, 2017)

I. INTRODUCTION

The Special Master should exclude the testimony of Dr. Richard Spruill, one of Mississippi's expert witnesses. Dr. Spruill did not apply the scientific principles of his field in forming his opinions in this case.[1] Dr. Spruill's testimony should be excluded because his theory of what makes an aquifer "intrastate" is fundamentally unreliable. His theory is precisely aimed at this litigation – so precisely, in fact, that Dr. Spruill is unable to apply his theory in a principled way to any other hypothetical cases. A theory that cannot be generalized or tested against other cases is by definition unscientific and unreliable. Adding to these deficiencies, Dr. Spruill takes the position that classifying an aquifer requires analysis beyond the scope of his expertise, including consideration of economic factors on which he is unqualified to opine.

Further, Dr. Spruill is not applying scientific principles in an objective way. Instead – as he candidly acknowledges – he uses a different standard in assessing the evidence here than he uses in his ordinary work. A scientific expert provides helpful testimony only by bringing to bear scientific principles that are unfamiliar to laypersons and lawyers. Thus, an expert who fails to apply scientific principles in favor of a litigation-driven analysis cannot provide anything helpful to the factfinder.

[1] Defendants have separately moved to exclude the testimony and opinions of Mississippi's other expert witness, David Wiley.

In short, Dr. Spruill's general approach, like his theory of interstate aquifers, demonstrates that he is not providing reliable, science-based opinions and that his testimony should be excluded under the principles of *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), and Federal Rule of Evidence 702.

II. ARGUMENT

A. Legal Standards

Expert testimony must meet certain basic standards to be admissible. Federal Rule of Evidence 702 provides:

> A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:
>
> (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
>
> (b) the testimony is based on sufficient facts or data;
>
> (c) the testimony is the product of reliable principles and methods; and
>
> (d) the expert has reliably applied the principles and methods to the facts of the case.

In short, even a qualified expert's testimony is admissible only if it "is reliable in proving or disproving the elements of the relevant cause of action." *Tyson Foods, Inc. v. Bouaphakeo*, 136 S. Ct. 1036, 1046 (2016). The principle that only reliable expert testimony is admissible guides the proceedings in original-jurisdiction actions. *See* Sup. Ct. R. 17.2.

The reliability requirement means that an expert's opinion "must be derived by the scientific method." *Daubert*, 509 U.S. at 590, 593. The scientific method requires that an expert rely on principles that can be tested against real-world examples. *See United States v. Mitchell*, 365 F.3d 215, 235 (3d Cir. 2004) (citing *Daubert*'s principle of "testability" or "falsifiability"). An "untested hypothesis" cannot be considered a valid scientific principle and is no more than "inadmissible speculation." *Tamraz v. Lincoln Elec. Co.*, 620 F.3d 665, 677 (6th Cir. 2010). A hypothesis that *cannot* be tested is not science at all; "[p]urely scientific testimony . . . is characterized by 'its falsifiability, or refutability, or testability.'" *United States v. Wilson*, 484 F.3d 267, 274 (4th Cir. 2007) (quoting *Daubert*, 509 U.S. at 593); *see also Clay v. Ford Motor Co.*, 215 F.3d 663, 676 (6th Cir. 2000) ("*Daubert* and *Kumho* [*Tire Co. v. Carmichael*, 526 U.S. 137, 152 (1999),] teach that whether such methodology is [valid] is determined by testing such data for 'falsifiability'").

The "objective" of the reliability requirement "is to make certain that an expert, whether basing testimony upon professional studies or personal experience, employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field." *Kumho*, 526 U.S. at 152. A court should be highly skeptical of "expert testimony prepared solely for purposes of litigation, as opposed to testimony flowing naturally from an expert's line of scientific research

or technical work." *Johnson v. Manitowoc Boom Trucks, Inc.*, 484 F.3d 426, 434 (6th Cir. 2007). That is especially so where an expert has "not only created his report for the purposes of litigation, but . . . created the precise methodology at issue for that purpose." *Mike's Train House, Inc. v. Lionel, L.L.C.*, 472 F.3d 398, 408 (6th Cir. 2006); *see also*, *e.g.*, *Adams v. Laboratory Corp. of Am.*, 760 F.3d 1322, 1333 (11th Cir. 2014) ("the scientific community's search for truth is . . . not driven by the self-interest of parties in litigation"). An expert whose opinion is driven by self-interest rather than science has nothing to offer the factfinder and should be excluded.

B. Dr. Spruill's Theory On The Classification Of Aquifers As Interstate Or Intrastate Is Unreliable

At the core of Dr. Spruill's proffered affirmative testimony is his most recent definition of "intrastate aquifer." His definition – disclosed for the first time in his July 31, 2017 "addendum" or rebuttal report – cannot be applied in an objective way and cannot be tested, as the scientific method demands, through generalization and application to other facts. It should be excluded.

"[T]he reliability analysis applies to all aspects of an expert's testimony," *Heller v. Shaw Indus., Inc.*, 167 F.3d 146, 155 (3d Cir. 1999), and so "*any step* that renders the analysis unreliable under the *Daubert factors renders the expert's testimony inadmissible*," *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 745 (3d Cir.

1994) (emphasis added in part). Here, each step of Dr. Spruill's analysis fails to stand up to scrutiny.

According to Dr. Spruill's most recent theory, an aquifer is an intrastate resource if, "under natural conditions" (1) "the majority of groundwater in an aquifer enters the groundwater system by recharge within a specific state"; (2) "that water flows ***VERY*** slowly through the aquifer within that same state"; and (3) "such that the water remains in the state for a ***VERY*** long periods of time before ultimately being discharged from the groundwater system." Ex. 2 (Spruill July Rep. 37). Dr. Spruill also opined that the decision to classify an aquifer as either interstate or intrastate "should not be conducted without a detailed consideration of the advantages and disadvantages of such a classification on the ability of a state to protect and manage the resource for the full benefit of its citizens." *Id*. at 37-38.[2] Based on his definition, Dr. Spruill opined in his rebuttal report that the groundwater "is an intrastate resource." *Id.* at 34. Each component of this theory fails scrutiny under the principles of *Daubert*, because it is based "on subjective belief and unsupported speculation." *In re TMI Litig*., 193 F.3d 613, 703-04 (1999), *amended on other grounds*, 199 F.3d 158 (3d Cir. 2000); *see also Elcock v. Kmart Corp.*, 233

[2] In other words, Dr. Spruill opines that, before a decision is made whether or not an aquifer is interstate or intrastate, an expert must first consider the advantages and disadvantages of classifying the resource as one or the other. In other words, the result depends on which result the expert believes to be advantageous.

F.3d 734, 747 (3d Cir. 2000) (finding a test unreliable because it was "subjective and unreproducible").

1. Dr. Spruill's definition of an intrastate aquifer should be excluded because it cannot be helpful to the trier of fact

To craft his definition of an intrastate aquifer, Dr. Spruill simply "reverse-engineer[ed] a theory to fit the desired outcome," *In re Mirena IUD Prods. Liab. Litig.*, 169 F. Supp. 3d 396, 430 (S.D.N.Y. Mar. 8, 2016), by selecting criteria that are "contrived to reach a particular result," *Rink v. Cheminova, Inc.*, 400 F.3d 1286, 1293 n.7 (11th Cir. 2005). In fact, Dr. Spruill's definition is so contrived to fit his desired ultimate opinion that Dr. Spruill admits it is capable of yielding only one result. According to Dr. Spruill's testimony, "there really aren't *any* interstate aquifers" and all "groundwater flow in our aquifer systems throughout this country are intrastate-type flows." Ex. 3 (Spruill Dep. 42:16-19) (emphasis added); *see also id.* at 43:22-44:11 (opining that all aquifers in the United States are intrastate aquifers).

When an expert relies on a result-driven analysis to support his or her opinions, as Dr. Spruill does here, that expert's testimony is not helpful and does not pass muster under *Daubert*. *See Kumho*, 526 U.S. at 157 (citing *General Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997)); *see also Loeffel Steel Prods., Inc. v. Delta Brands, Inc.*, 387 F. Supp. 2d 794, 803 (N.D. Ill. 2005) (finding that the expert's admission that he created the definition and that it was not to be found anywhere

else "would seem to trigger the principle that the opinion of an expert need not be accepted when based on nothing more than personal opinion or belief instead of an understandable scientific basis"); *Claar v. Burlington N.R.R. Co.*, 29 F.3d 499, 502-03 (9th Cir. 1994) ("Coming to a firm conclusion first and then doing research to support it is the antithesis of th[e] [scientific] method.").

The elements of Dr. Spruill's "definition" of an intrastate aquifer are subjective and incapable of being quantified. As shown below, not even Dr. Spruill can explain them.

a. Dr. Spruill cannot and, in fact, refuses to explain what constitutes a "majority" of water for purposes of his definition

The first criterion in Dr. Spruill's definition of an intrastate aquifer is that a "majority" of the groundwater entering the aquifer must enter in the State. Ex. 3 (Spruill Dep. 49:11-17). When asked to explain, Dr. Spruill testified that "majority" meant that more than 50% of the water recharging the aquifer must be entering in one State. *Id.* at 51:17-22. However, Dr. Spruill also testified that his opinion would not change if the amount of water recharging into the State was less than 50%. *Id.* at 50:14-20.

Dr. Spruill was asked whether the volume of pre-development interstate flow – that is, the amount of groundwater that naturally moved across the state boundary – might impact his first factor. Dr. Spruill conceded that, under pre-development

conditions, "a small amount" of groundwater in the Memphis-Sparta Aquifer naturally flowed from Mississippi into Tennessee. *Id.* at 66:3-4. However, Dr. Spruill testified that "it doesn't change [his] definition of an intrastate resource as applicable to this case." *Id.* at 66:4-6; *see id.* at 70:6-7 ("A small amount of cross-border flow does not an interstate aquifer make."). Dr. Spruill was then asked to explain what he meant by "a small amount" of water. Dr. Spruill could only opine that "small" simply refers to "[a] percentage like that which is flowing from Tennessee to Mississippi today, which is small." *Id.* at 71:8-14.

When Dr. Spruill was asked to explain how another hydrologist could apply his "test" to determine whether the volume of groundwater naturally flowing across the state boundary was "small" enough, he refused (literally) to answer: "I don't have a number for 'small.' I'm not going to put a number on 'small.' I'm not going to do it." *Id.* at 72:2-24. When pressed further, Dr. Spruill testified that 10% of cross-boundary flow seemed "to be a small percentage," but even then it would depend on other factors. *Id.* at 74:19-75:9. The first criterion in Dr. Spruill's definition is not objective, cannot be tested, and cannot be considered reliable.

b. Dr. Spruill cannot explain what "*VERY* slowly" means as it applies groundwater flow speed for purposes of his definition

The second criterion in Dr. Spruill's definition is that groundwater entering an aquifer within a given State must move "*VERY* slowly," Ex. 2 (Spruill July Rep.

37), or "incredibly slowly," Ex. 3 (Spruill Dep. at 54:11-14), within that same State. While Dr. Spruill first testified that "incredibly slowly" means "velocities of a fraction of a foot per day," he then could not articulate what velocity would be too fast to meet his "test." *Id.* at 56:14-15; 59:6-11. Dr. Spruill concedes that aquifers sometimes can have groundwater velocities that can be "appreciably larger measured in distances of feet and even tens of feet per day," which he would consider "very" rather than "incredibly" slow. *Id.* at 57:4-15, 58:8-22. Remarkably, however, Dr. Spruill still would consider a "very slow velocity" to satisfy the second element of his test. *Id.* at 58:8-59:11. Again, this component appears to rely entirely on Dr. Spruill's subjective views, which undermines the reliability. The second criterion in Dr. Spruill's definition is unworkable.

c. Dr. Spruill cannot quantify a "*VERY* long" residence time

The third criterion in Dr. Spruill's "test" is that the water must have a "*VERY* long" "residence time" in the State in which it entered the aquifer. Ex. 2 (Spruill July Rep. 37); Ex. 3 (Spruill Dep. 75:24). As with the other elements of his "test," Dr. Spruill was not able to quantify what length of time was sufficiently long to qualify as a very long "residence time." *Id.* at 62:16-63:21. Not surprisingly, however, he opined that a majority of water in the Memphis-Sparta Aquifer had a residence time in Mississippi that was long enough to satisfy his test. *Id.* at 66:1-23.

d. By Dr. Spruill's own admission, his "definition" of an intrastate aquifer cannot be applied to anything other than the aquifer at issue in this case

By Dr. Spruill's own admission, his definition can be applied only to the specific resource at issue in this case. When asked to evaluate whether Lake Michigan would qualify as an interstate lake under his criteria, Dr. Spruill testified that he could not answer the question. Ex. 3 (Spruill Dep. 117:16-119:4). When asked how his criteria would be applied to a glacier that crosses state lines, Dr. Spruill testified that the hypothetical was "so far-fetched" he could not answer or apply his test. *Id.* at 119:5-120:18.

Nor could Dr. Spruill apply his criteria to a pre-development map of the Aquifer at issue in this case developed from work of Tennessee's expert Dr. Brian Waldron, which shows a larger amount of pre-development interstate flow than some other maps. Dr. Spruill *refused* to answer the question, stating: "As a scientist that is not a question I can even deal with. I can't deal with that question." *Id.* at 78:8-23. Dr. Spruill's methodology can only be viewed "as lacking the objectivity that is the hallmark of the scientific method." *Claar*, 29 F.3d at 503.

Further demonstrating Dr. Spruill's lack of reliability is his admission that, based on his definition, <u>all</u> groundwater would meet his criteria for slow movement and residence time. *See* Ex. 3 (Spruill Dep. 59:6-11) ("Q. I think I understand you. There is no groundwater that you know of that would be flowing quickly enough for

it not to meet this second factor of your test for an interstate aquifer? A. I would agree."); *id.* at 63:11-21. Thus, Dr. Spruill's definition expands as needed to ensure that it encompasses any hypothetical or, presumably, actual facts – as Dr. Spruill conceded. *See id.* at 65:15-17 ("Q. Would there be – are there other cases where you would apply the factors differently? A. I don't know of any I've studied.").

A theory that cannot be tested through generalization and application to other factual scenarios (whether other aquifers or other water resources) is non-falsifiable and, by definition, non-scientific. *See TMI Litig.*, 193 F.3d at 703 n.144 ("[I]t is impossible to test a hypothesis generated by a subjective methodology because the only person capable of testing or falsifying the hypothesis is the creator of the methodology."). Dr. Spruill's theory is non-falsifiable and subjective, and cannot be helpful to the factfinder because Dr. Spruill cannot or will not quantify any of his criteria to allow the factfinder to consider the objective application of his test to a given resource.

e. Dr. Spruill did not even attempt to consider the advantages and disadvantages of designating an aquifer as interstate or intrastate

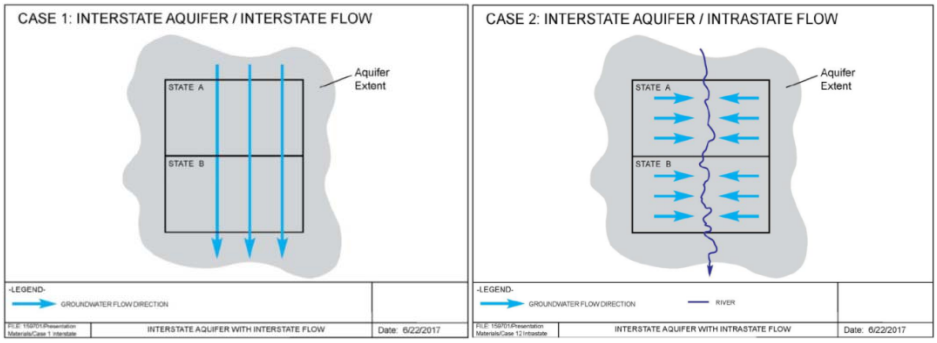
Dr. Spruill opines that, in addition to the above criteria, "decisions regarding the classification of groundwater resources as intrastate versus interstate should not be conducted without a detailed consideration of the advantages and disadvantages of such a classification on the ability of a state to protect and manage the resource

for the full benefit of its citizens." Ex. 2 (Spruill July Rep. 37-38); *see* Ex. 3 (Spruill Dep. 84:9-21). By adding this criterion to his test, Dr. Spruill effectively concedes that he has not provided a reliable opinion on whether the Aquifer constitutes an interstate resource, because he concedes that he has "not performed a detailed consideration of all the advantages and disadvantages." *Id.* at 85:6-8. Indeed, Dr. Spruill testified that such a consideration would be impossible without expertise in other fields: "there are other factors involved that are beyond my ability to make those conclusions," including "legal issues" and "economic issues." *Id.* at 86:19-21, 87:4-8. Dr. Spruill's opinion that the Aquifer is an intrastate resource does not even adhere to the criteria that he, himself, invented. Further, Dr. Spruill is not even qualified to offer an opinion on his fourth factor. Dr. Spruill is "not an economist" and has "not done any of those calculations or considerations." *Id.* at 87:24-88:1; *see also id.* at 91:21-24 ("Q. You don't know how much the economics have been impacted? A. I've not done any calculations like that.").

Finally, this last element of Dr. Spruill's definition – by itself – confirms that Dr. Spruill's "definition" (and, as a result, his opinion) is void of objectivity. Because it is wholly subjective, Dr. Spruill's "definition" lacks the hallmarks of scientific theory: "falsifiability, or refutability, or testability." *Daubert*, 509 U.S. at 593.

2. Dr. Spruill's "definition" of an intrastate aquifer is unreliable because it is litigation-driven

Dr. Spruill's "definition," which first appeared in his *rebuttal* report, is independently unreliable because it directly contradicts the definition of an interstate aquifer that appeared in his opening expert report. In his opening report, Dr. Spruill included two hypotheticals, Case 1 and Case 2, both of which involve two States and what Dr. Spruill called an "interstate aquifer." Ex. 1 (Spruill June Rep. 32-34). Dr. Spruill's illustrations of his Case 1 and Case 2 are shown below:



Dr. Spruill testified that he defined the aquifer in Case 1 and Case 2 as "interstate" because "*it underlies*" or "*exists beneath*" "*both states*." Ex. 3 (Spruill Dep. 106:16-107:9; 110:18-111:9) (emphases added).[3] Dr. Spruill admitted that, based on that definition, *the Aquifer at issue in this case is an interstate aquifer*. *See id.* at 77:6-7;

[3] Dr. Spruill testified that the groundwater flow in Case Study 1 is "interstate" because it "flows from one state to the other," Ex. 3 (Spruill Dep. 107:10-22), and the flow in Case Study 2 is "intrastate flow" because the flow is confined "within a state," *id.* at 111:7-112:3.

id. at 109:7-11 (conceding that, "[i]n terms of its physical presence," the Aquifer is an interstate aquifer).

This use of the terms "interstate" and "intrastate" is consistent with the common use of those terms. In his rebuttal report, however, Dr. Spruill reversed himself, stating that "the geographic distribution of those aquifers does not define the groundwater resources as interstate." Ex. 2 (Spruill July Rep. 34). Dr. Spruill instead proposed the convoluted definition of an interstate aquifer discussed above, which he invented during the four weeks between the submission of his original and rebuttal reports. *See id.* at 37. That dramatic change in Dr. Spruill's opinions again shows that he is not applying scientific principles as required by *Daubert*, but altering his opinions as needed for purposes of litigation. Thus, independent of the fundamental flaws in his latest theory, this dramatic about-face shows that Dr. Spruill's analysis is the epitome of a "precise methodology" created "for the purposes of litigation," *Mike's Train House*, 472 F.3d at 408, and should be excluded.

C. Dr. Spruill's Analysis Of Dr. Brian Waldron's Work Further Demonstrates That Dr. Spruill's Opinions Are Driven By Litigation, Not An Objective Application Of Scientific Principles

Dr. Spruill's opinions in this case are not reliable because, by his own admission, he has applied different principles in this litigation than he would in his ordinary practice in the field. Dr. Spruill's opinions therefore "lack[] the objectivity

that is the hallmark of the scientific method," *Claar*, 29 F.3d at 503, and should be excluded for that reason alone.

As discussed in Part II.A, above, the litigation-driven nature of Dr. Spruill's opinions is pervasive. Another obvious example is his criticism of Dr. Brian Waldron's article on pre-development groundwater conditions (the "Waldron & Larsen paper")[4] as compared with his uncritical acceptance of other publications concerning the same subject matter. The Waldron & Larsen paper uses 1900s-era USGS data about water levels in wells to estimate pre-development groundwater conditions in the Middle Claiborne Aquifer. In Dr. Spruill's July 2017 report, he contends that the Waldron & Larsen paper used "wholly unreliable" data that made its conclusions "meaningless in the context of sound science." Ex. 2 (Spruill July Rep. 4-5). Dr. Spruill proceeds to offer at least 15 distinct criticisms of Waldron & Larsen – for example, arguing that documentation of early well construction methods was inadequate. *Id.* at 17-21. These criticisms range from the specious to the flatly incorrect, as Dr. Waldron demonstrated in his sur-rebuttal report.[5]

[4] Brian Waldron & Daniel Larsen, *Pre-Development Groundwater Conditions Surrounding Memphis, Tennessee: Controversy and Unexpected Outcomes*, 51 J. Am. Water Res. Ass'n 133 (Feb. 2015).

[5] For example, Dr. Spruill inexplicably argues that "[m]any 'wells' cited [Waldron & Larsen] 2015 [sic] *are <u>not</u> actually wells*." Ex. 2 (Spruill July Rep. 17). This assertion is contradicted by even a cursory examination of the original USGS sources.

However, more significantly for purposes of determining whether Dr. Spruill applied scientific principles, Dr. Spruill did not even consider whether several other papers that he relied upon might be subject to similar criticisms. Dr. Spruill explained why in his deposition: He treated Dr. Waldron's work differently than he treated other scientists' work *because Dr. Waldron is an expert in this case*. Indeed, Dr. Spruill explicitly stated that he did not consider the work of another scientist, J.E. Reed, with the same intellectual rigor as Dr. Waldron's because "Reed was not an expert in this case. Reed didn't read my expert report and comment on it." Ex. 3 (Spruill Dep. 177:8-10).

Thus, although Dr. Spruill "extensively" studied the primary sources upon which Dr. Waldron relied in the 2015 article, he did not do so for Reed's 1972 paper or for another paper on which Dr. Spruill relied, Criner & Parks (1976).[6] Ex. 3 (Spruill Dep. 177:1-23). Dr. Spruill devoted a 12-page index to a well-by-well analysis of Waldron & Larsen's data (or "control") points, picking out details for criticism like an unknown "screen interval" or a lack of information on "grout seal." *See* Ex. 2 (Spruill July Rep. 40-51). In contrast, Dr. Spruill did not even attempt to find out whether Reed's wells were properly grouted, Ex. 3 (Spruill Dep. 171:7-10),

[6] James H. Criner & William Scott Parks, *Historic Water-Level Changes and Pumpage from the Principal Aquifers of the Memphis Area, Tennessee: 1886-1975*. USGS Water-Resources Investigations Report 76-67 (1976), https://pubs.er.usgs.gov/publication/wri7667.

and did not look at anything outside the Criner & Parks paper to check whether their data points were well-documented, *id.* at 164:7-12.

Dr. Spruill's lack of rigorous treatment of Criner & Parks is highlighted by his claim that "[i]t was important to me that Criner and Parks used observation wells located at various distances from well fields and away from the estimated center of pumping. . . . They give a truer picture of groundwater conditions than using water levels taken in production wells." *Id.* at 161:19-22, 162:3-5. In fact, the Criner & Parks map of pre-development conditions relies on data from non-observation wells and indeed from an underground tunnel about which "little is known" – none of which Dr. Spruill seems to have noticed, in stark contrast to his close analysis of Dr. Waldron's work. *See* Ex. 10 (Waldron August Rep. ¶¶ 28-29, 41-43). And, although Dr. Spruill considered and criticized every single individual control point used in the Waldron & Larsen paper, he did not even bother to figure out whether the "dots" on Reed's 1972 maps were control points (*i.e.*, wells) or cities: "I'm sure [Reed] had some control points. I see some dots there. I don't know how many. They may be cities." Ex. 3 (Spruill Dep. 171:1-3). In short, Dr. Spruill applied an entirely different standard to the Waldron & Larsen paper than to other scientific papers, based on Dr. Waldron's presence in this case.

Dr. Spruill applied the same litigation-tinted lens to Waldron & Larsen's derivation of their water-level contour map from the data. Dr. Spruill challenged

Waldron & Larsen's estimation of water-level contours and indeed attempted to sketch his own alternative contours. *See id.* at 202:10-21.[7] In contrast, Dr. Spruill did not consider whether any data at all justified the contour lines on the Criner & Parks map, apparently because in Dr. Spruill's estimation they were "well-meaning scientists." *Id.* at 166:24. Nor did he attempt to redraw their contour lines, as he did for Waldron & Larsen. *See id.* at 168:14-18. Indeed, Dr. Spruill did not know whether Criner & Parks used hand-drawn or computer-drawn contour lines. *See id.* at 167:17-23.

Similarly, Dr. Spruill gave no consideration to Reed's justification for the contour lines on Reed's 1972 map. Instead, he treated Reed differently than Dr. Waldron because:

> These maps produced by a person like Reed back in 1972 were not drawn to try to prove that groundwater was flowing across the state boundary. They were a scientist's best interpretation of groundwater flow patterns on a regional scale. They could be off. They could be wrong. But they are 1972 interpretations of somebody's understanding of how the groundwater system worked.

Id. at 170:7-15. In other words, Dr. Spruill is happy to rely on studies that are "off" or "wrong" so long as they come to the correct conclusion for his purposes in this

[7] Dr. Spruill's alternative contours were based on a misunderstanding of Waldron & Larsen's map. Dr. Spruill wrongly believed that Waldron & Larsen had ignored a particular data point in Arkansas when they drew their contours; in fact, however, they accounted for that data point, but it was too far west to appear on the final version of the map. *See* Ex. 10 (Waldron August Rep. ¶ 30).

litigation. And, although Dr. Spruill castigated Waldron & Larsen for drawing contour lines in both the confined and unconfined portions of the Aquifer, *see* Ex. 2 (Spruill July Rep. 21-22), he completely ignored the fact that Reed did so as well, *see* Ex. 3 (Spruill Dep. 172:1-174:21), and indeed that doing so is common practice by USGS scientists, *see* Ex. 10 (Waldron August Rep. ¶¶ 13-22) (citing four different USGS papers that follow this practice).

In every instance, Dr. Spruill applied a different standard to Dr. Waldron's work than to the work of other hydrogeologists. Dr. Spruill candidly acknowledged that he did so because Dr. Waldron is an expert witness here. That is precisely the opposite of what *Kumho* requires: Dr. Spruill is *not* "employ[ing] in the courtroom the same level of intellectual rigor that characterizes [his] practice . . . in the relevant field." *Kumho*, 526 U.S. at 152. Dr. Spruill's opinion does not "flow[] naturally" from his "technical work," *Johnson*, 484 F.3d at 434, and can only be viewed "as lacking the objectivity that is the hallmark of the scientific method," *Claar*, 29 F.3d at 503. Dr. Spruill's opinions are not based on rigorous science, and his testimony should be excluded.

CONCLUSION

The Special Master should exclude Dr. Spruill's testimony.

Respectfully submitted this 1st day of November 2018,

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CERTIFICATE OF SERVICE

Pursuant to Paragraph 3 of the Special Master's Case Management Plan (Dkt. No. 57), I hereby certify that all parties on the Special Master's approved service list (Dkt. No. 26) have been served by electronic mail, this 1st day of November 2018.

/s/ *David C. Frederick*

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