No. 09-139, Original

In The
Supreme Court of the United States

The State of Mississippi,
Plaintiff,

v.

The City of Memphis, Tennessee,
Memphis Light, Gas & Water Division,
and The State of Tennessee,
Defendants.

On Motion for Leave to File Bill of Complaint in Original Action

THE STATE OF MISSISSIPPI'S REPLY TO BRIEF IN OPPOSITION OF THE STATE OF TENNESSEE TO MOTION FOR LEAVE TO FILE BILL OF COMPLAINT IN ORIGINAL ACTION

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QUESTIONS PRESENTED

Whether the Supreme Court should exercise its jurisdiction to resolve a dispute over the reach of the disputed sovereign rights claimed by both the State of Mississippi ("Mississippi") and the State of Tennessee ("Tennessee") under the Constitution of the United States ***if*** the Court denies Mississippi's Petition for Writ of Certiorari, or affirms the determination by the United States Court of Appeals for the Fifth Circuit that Tennessee is a necessary party to Mississippi's action for damages.

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INTRODUCTION

Mississippi simultaneously filed its Petition for Writ of Certiorari and its Motion for Leave to File Bill of Complaint in Original Action to minimize the potential for further delay of judicial relief for an ongoing wrongful appropriation and conversion of Mississippi's territorial ground water by the City of Memphis, Tennessee ("Memphis") and its public utility, Memphis Light, Gas & Water ("MLGW"). Tennessee's support of Memphis and MLGW in their appropriation of Mississippi's intrastate ground water is an improper extension of its sovereign powers beyond its borders. If the Court entertains Tennessee's position, then this is the "model case for invocation of this Court's original jurisdiction." *Mississippi v. Louisiana,* 506 U.S. 73, 76 (1992). If the Court, consistent with existing precedent, rejects the "equitable apportionment" argument, it may chose to exercise its original, but not exclusive, jurisdiction.

This dispute does not involve "interstate waters," as Tennessee contends. The ground water at issue is intrastate in character and would never reside within Tennessee's boundaries under natural conditions. This is not disputed by Memphis and MLGW, whose own experts and consultants confirm that Defendants' pumping operations are pulling billions of gallons of intrastate ground water naturally residing beneath Mississippi into Tennessee. Supp. App., 243a-283a. *See also* App., 56a-117a.

Tennessee asserts conclusorily that the pure ground water accumulated over thousands of years and naturally residing within a deep, confined geological formation within Mississippi's borders is

"interstate water," just like the Arkansas River water flowing through multiple states which the Court apportioned in *Kansas v. Colorado*, 206 U.S. 46 (1907). Resting on this premise, Tennessee argues that Mississippi is impotent to establish the property law controlling the rights in this natural resource and that Mississippi's injuries are not sufficiently serious for consideration by the Court. There is no more serious matter than the right of a state to protect and preserve its territorial natural resources.

I. MISSISSIPPI'S UNLAWFUL CONVERSION ACTION RESTS ON THE SOVEREIGN POWERS RETAINED BY THE STATES UNDER THE UNITED STATES CONSTITUTION

Tennessee's reading of the equitable apportionment cases ignores the extensive discussion in *Kansas v. Colorado*, 206 U.S. 46 (1907) explaining that under the Constitution each state "has full jurisdiction over the lands *within its borders*, including the beds of streams and other waters." *Id.* at 93 (emphasis added). As to these resources, the Constitution preserves each state's power to establish controlling property law. *Id.* at 93-95. This total sovereignty of each state over *the same volume of flowing river water* as it traversed multiple states from beginning to end made the dispute one between sovereign states similar to a dispute under international law. *Id.* at 97.

Tennessee's assertion that ground water residing for millennia in a confined geological sand formation within Mississippi is actually "interstate water" finds no support in the equitable apportionment cases, which affirm Mississippi's sovereign right to bring this

action. The ground water at issue in Mississippi is not "interstate water." It is intrastate ground water to which neither Tennessee nor its citizens hold any claim or "equality of right." Unlike the river apportionment cases, there is no historical, natural or Constitutional foundation supporting Defendants' claims that MLGW's ability to mechanically siphon and extract this ground water which naturally resides within Mississippi creates controversy between states triggering a need for equitable apportionment. As a matter of state sovereignty, Mississippi is entitled to money damages for the unlawful taking of ground water which is clearly not a shared natural resource.

A. The Court Has Never Denied a State's Right to Establish The Property Law Applicable to Ground Water Naturally Residing Within Its Borders

1. The States' Sovereign Interest Recognized in the Equitable Apportionment Cases Supports Mississippi's Requested Relief

The Court's equitable apportionment cases support Mississippi's position, not that of Tennessee, Memphis or MLGW. In its seminal decision, *Kansas v. Colorado*, 206 U.S. 46 (1907), the Court first addressed competing state claims to surface water naturally flowing across state lines in an interstate river: "Before either Kansas or Colorado was settled the Arkansas River was a stream *running through* the territory which now composes these two States."*Id.* at 98. This was a dispute over water historically naturally flowing across state lines. Nevertheless, in defining its jurisdiction, the Court expressly affirmed

that under the Constitution each state retains its full sovereign authority to determine the property law applicable to all waters flowing or residing within its borders, subject only to the federal government's power over interstate commence. *Id.* at 93-96. In this sovereign capacity each state has the right and power to determine what property law it will apply to the waters within its territory. *Id.* at 94.

The Constitutional deference to the sovereignty of the states over their waters was recognized throughout the Court's opinion in which it identified property law within the state borders as a matter of its internal affairs reserved unto the state under the United States Constitution. *See id.* at 90; *Alden v. Maine*, 527 U.S. 706, 714-15 (1999). The Court acknowledged that the state's sovereign right to establish the property law relating to water, standing alone, would allow Colorado to appropriate all river water flowing through its boundaries, denying Kansas most of the water which has always flowed within its boundaries under natural conditions. 206 U.S. at 98.

These Constitutional restrictions led the Court to treat the dispute as one between two "States sovereign and independent in local matters" under the same jurisdiction it exercises under international law. *Id.* at 97. Both states held a legal claim to the same flowing water while it moved within that state's boundaries, and the cardinal rule of equality of right prohibits one state from imposing its sovereign will on another. *Id.*, 97-98. Equality of right required the equitable apportionment of a natural resource to which both held a legitimate claim: one volume of surface water flowing among the respective states; but it neither converts the natural resources residing within a state's

boundaries to shared resources, nor undermines the states sovereign right to determine the applicable property law. *See, Oregon v. Corvallis Sand & Gravel,* 429 U.S. 363, 377-78 (1977) (under federal system property ownership is governed by the laws of the several states).

2. Under Mississippi Law the State Owns All Waters Within Its Territory and Citizens of Mississippi May Obtain *Usufructory* Rights

The equitable apportionment cases provide no support to a state or its citizen claiming the right to appropriate from another state intrastate ground water residing within that state through the force of pumping. The ground water at issue in this case was not shared in the pre-settlement territories now making up Mississippi and Tennessee. It is a natural resource over which Mississippi holds full sovereign power to establish the controlling law, and the right to establish its own law is recognized by both the decisions of its supreme court and its legislative body. *See Cinque Bambini Partnership v. Mississippi*, 491 So.2d 508 (Miss. 1986), *aff'd in Phillips Petroleum v. Mississippi*, 484 U.S. 469 (1988); MISS. CODE ANN. §§51-3-1, *et seq.* (1985 & Supp 2009).

Tennessee's argument that Mississippi law only recognizes a mere *usufructory* right in the state over its territorial waters based on the Mississippi Supreme Court's decision in *Dycus v. Sillers*, 557 So.2d 486 (Miss. 1990) is groundless. *Dycus* was a dispute between private landowners who admittedly possess only the right to use the waters on their lands, and it was authored by the same Mississippi Supreme Court

Justice who authored *Cinque Bambini,* Justice James Robertson. The two cases address the rights held in two distinct capacities, that of citizen and that of sovereign. This dichotomy is not new. Nothing in the Court's decisions converts Mississippi's resident, intrastate ground water into "interstate waters" subject to appropriation by or apportionment with another state.

B. Tennessee's Authorities Do Not Support Its Argument that All Water Residing in the Aquifer Constitutes "Interstate Waters" Subject To Equitable Apportionment

Washington v. Oregon, 297 U.S. 517 (1936), *Kansas v. Colorado,* 533 U.S. 1 (2001), and *Texas v. New Mexico,* 462 U.S. 554 (1983) all include some discussion of ground water. Neither these cases nor the other equitable apportionment cases support Tennessee's argument.

Every discussion of ground water in an equitable apportionment case has been in the context of ground water claimed to be hydrologically connected to interstate surface water being apportioned. *Washington v. Oregon* is illustrative. The Court addressed apportionment of river water running through Washington and Oregon where it was alleged that subsurface water being pumped by farmers was decreasing the river flow and should be addressed in the apportionment. The Court rejected this argument finding that irrigation water being pumped did not materially impact the surface water being apportioned. 297 U.S. at 525.

In its discussion, the *Washington* Court referred to state cases illustrating the distinction between the flowing "interstate waters" discussed in the equitable apportionment cases, and the cases addressing ground water. In one such case, *Jarvis v. State Land Dep't*, 479 P.2d 169 (Ariz. 1970), the Arizona Supreme Court found that the City of Tucson had no right to pump water from wells and transport it to another location for municipal purposes (even though its activities fell entirely within Arizona's borders), stating: "[i]t is imperative that the people of the city have water; it is not imperative that they secure it at the expense of those owning lands adjoining lands owned by the city."*Id.* at 172. The rule in *Jarvis* as embraced by this Court in *Washington* confirms that under the Constitution and the law of the state, Mississippi owns the intrastate ground water residing in its boundaries, and neither Tennessee nor its citizens have the right to appropriate it without compensation.[1]

C. As Trustee of the State's Natural Resources, Mississippi is Entitled to Sue for Conversion of Such Resources by a Citizen of Tennessee

Tennessee's argument that Mississippi's intrastate ground water is actually "interstate water" derives from the Fifth Circuit's erroneous conclusion that "[t]he **Aquifer is** an interstate water **source**, and the

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[1] Tennessee's argument challenging Mississippi's sovereignty is inconsistent with the water rights legal regimes expressed in hundreds of statutory enactments and dozens of judicial decisions of every state in the country based on state-ownership and management of water resources. *See, e.g.*, cases and statutes compiled at App., 216a-224a.

amount of water to which each state is entitled from a disputed **interstate water source** must be allocated before one state may sue an entity for invading its share."(*citing Hinderlider v. La Plata River & Cherry Ditch Co.*, 304 U.S. 92, 104-105) (Opp. Br., 9, emphasis added).

Nothing in *Hinderlider* addresses the need to apportion the medium through which water moves, and the entire argument on which Memphis and MLGW prevailed below is built on the false premise that the aquifer (geological formation) and the ground water contained and residing in it, are indistinguishable. Tennessee has seized upon the lower courts' confusion to allow Memphis and MLGW to assail Mississippi's sovereign rights over its natural resources with impunity.

Mississippi's power to sue trespassers for money damages in protection of its citizens' right to use the State's waters lies at the core of its public trust responsibilities. *See State Game & Fish Comm'n v. Louis Fritz Co.*, 187 Miss. 539, 193 So. 9 (1940); *State ex rel. Rice v. Stewart*, 184 Miss. 202, 184 So. 44 (1938). The State's right to recover money damages for wrongful appropriation by another state or its citizens is well-established in this Court's precedent. *See Kansas v. Colorado*, 533 U.S. 1, 7-11 (2001); *Texas v. New Mexico,* 482 U.S. 124, 132, n. 7.(1987); *Georgia v. Tennessee Copper Co.*, 206 U.S. 230, 237 (1907).

II. SHOULD THE COURT FIND THE MISSISSIPPI GROUND WATER IN THE AQUIFER TO BE "INTERSTATE WATERS" THE COURT SHOULD EXERCISE ITS

EQUITABLE JURISDICTION TO RESOLVE THIS DISPUTE

Tennessee unequivocally acknowledged Mississippi's sovereignty over its territorial ground water (and asserted its own) before the Fifth Circuit. App., 227a-242a. Changing its positions entirely, Tennessee now asserts before this Court an unprecedented and inappropriately aggressive form of state sovereignty, seeking to reach across its border to extend equitable apportionment to natural resources which can be mechanically appropriated from another state, if technology allows the appropriation to be accomplished from within Tennessee's boundaries. *New Hampshire v. Maine*, 532 U.S. 742, 749-756 (2001) bars Tennessee's new position denying state-ownership of intrastate waters.

A. Mississippi's Complaint Asserts Injury of a Sufficiently "Serious Magnitude" to Invoke the Court's Jurisdiction

Mississippi's Complaint and the voluminous evidence attached to its brief detail the real, direct and substantial injury suffered by Mississippi in relation to its critically important interests in state water resources. Tennessee cites *Colorado v. New Mexico*, *Nebraska v. Wyoming*, *New York v. New Jersey*, *Washington v. Oregon*, *Kansas v. Colorado*, *Arizona v. California*, *Connecticut v. Massachusetts*, and *Idaho ex rel. Evans* for the proposition that Mississippi has not met its burden of showing "serious injury" to its "substantial interests." Opp. Br., 23-27. As shown *infra*, Defendants' past and ongoing diversions of ground water from Mississippi have forever altered the aquifer ground water budget, lowering the water levels

by hundreds of feet and draining the aquifer faster than it can be naturally replenished. Defendants' extraction operations have moved hundreds of billions of gallons of ground water from storage in Mississippi into storage and use by Memphis. This water is permanently lost as there is no return flow. Defendants continue to convert almost nine billions gallons annually. Mississippi's showing of the requisite factors to justify this Court's exercise of original jurisdiction cannot be doubted.

B. Mississippi Pled, and Has Never Disclaimed, Injury from Defendants' Diversions of Its Intrastate Ground Water

Tennessee urges the Court to dispose of the matter at a preliminary stage, relying on *Arizona v. California*, *Alabama v. Texas*, *Alabama v. Arizona*, and *Ohio v. Kentucky*. Yet, Mississippi meets all of the criteria lacking in the complaints dismissed in those actions.

Mississippi's claim is not "premature," as in *Arizona v. California* because the decree sought by Mississippi relates to "present use of the water" by Memphis and MLGW with Tennessee's acquiescence which "infringes rights" Mississippi has asserted. 298 U.S. at 571-72. The complaint dismissed in *Alabama v. Arizona* was multifarious. 291 U.S. at 291. Mississippi has not united distinct and disconnected subjects or causes or joined parties who are without common connection in the outcome of the litigation. No advisory opinion or declaratory judgment is requested and Mississippi has alleged "facts that are clearly sufficient to call for a decree in its favor" to remedy a real, imminent injury "of serious magnitude" regarding

a "direct issue" that will "cause [Mississippi] to suffer great loss . . . and serious injury." *Id.* at 291-292.

Leave was denied in *Alabama v. Texas* because Congress, not the Court, exercises powers over federal lands. 347 U.S. at 273-74. *Ohio v. Kentucky* is inapposite as Ohio's allegations were "not as yet formally controverted" by Kentucky in a border dispute where Ohio sought to "alter [long-settled] legal rights." 410 U.S. at 645, 648.

Defendants' municipal pumping has destroyed the normal steady-state equilibrium of the aquifer and totally altered the ground water budget. Defendants' experts and consultants admit that Memphis' pumping has created the massive regional cone of depression that draws ground water from north Mississippi[2] across the state line into MLGW's well fields. Supp. App., 243a-283a. Over 400 billion gallons of ground water -- which would never have naturally moved northward and crossed into Tennessee -- have been permanently moved from Mississippi to Memphis' water supply. App., 57a-61a, 63a-117a. Defendants continue to siphon almost nine billion gallons of ground water from north Mississippi annually. *Id.*

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[2] Defendants try to bolster their "interstate waters" theme by improperly comparing ground water residing in the small, discrete and isolated sand formation underlying Mississippi to the volumes of ground water throughout the entire geologic aquifer formations beneath Arkansas, Tennessee and Mississippi. Opp. Br., 29. They admit however that ground water residing under north Mississippi is unaffected by pumping in other aquifers in other states throughout the Mississippi Embayment. Supp. App., 246a-247a, 258a-259a, 267a-270a, 272a-277a.

MLGW's pumpage has caused water levels in the confined aquifer to drop hundreds of feet, *id.*, 93a-100a, and water is being withdrawn faster than it can be replenished by natural forces. *Id.*, 74a. Mississippi has suffered, and continues to suffer, precisely the type of real, substantial harm that merits this Court's exercise of its original and exclusive jurisdiction.

C. Mississippi's Right to Recover Damages for the Wrongful Appropriation of Its Intrastate Ground Water is Well Established

Idaho ex rel. Evans v. Oregon, 462 U.S. 1017, 1025 (1983) does not support Tennessee's apportionment argument as the Court was applying the same principle "that animates many of the Court's Commerce Clause cases."

The specific ground water at issue here is not interstate water subject to equitable apportionment and the Commerce Clause is not implicated. The ground water at issue in this case has resided in Mississippi since its admission into the Union, and would still reside in Mississippi but for Defendants' massive pumping operation. In its capacity as sovereign, Mississippi is duty-bound to sue for damages to compensate for the wrongful appropriation of water by another state or its citizens.

CONCLUSION

In the event that this Court denies Mississippi's Petition for Writ of Certiorari, Mississippi requests the Court to exercise its original jurisdiction, grant the instant Motion and allow the matter to proceed to full

and complete adjudication before this Court. Mississippi also welcomes a full merits review as requested by Tennessee through such further briefing and submission of evidence as the Court deems appropriate.

Respectfully submitted,

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THE STATE OF MISSISSIPPI'S MOTION FOR LEAVE TO FILE BILL OF COMPLAINT IN ORIGINAL ACTION - TENNESSEE

SUPPLEMENTAL APPENDIX

APPENDIX J

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF MISSISSIPPI
DELTA DIVISION

JIM HOOD, Attorney General, ex rel,
THE STATE OF MISSISSIPPI, Acting
for itself and Parens Patriae for
and on behalf of the People of the
State of Mississippi,

Plaintiff,

Vs. Case No. CIVIL ACTION 2:05CV32D-B
(And Related Cases)

THE CITY OF MEMPHIS, TENNESSEE and
MEMPHIS LIGHT, GAS & WATER DIVISION,

Defendants.

THE DEPOSITION OF JOHN VAN BRAHANA
November 5th, 2007

BRIAN F. DOMINSKI, RPR, RMR
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[p. 8]

DIRECT EXAMINATION BY MR. CAMERON:

Q. Would you please state your name for the record.

A. John Van Brahana.

* * *

[p. 10]

Q. By whom were you retained?

* * *

A. Baker, Donelson, Bearman

Q. What was the scope of or your charge in connection with your duties as a consulting expert? In other words, what services were you asked to provide by the Baker-Donelson Lawfirm?

A. Assessment of technical work that I had done previously, groundwater geology, in the area . . . I had worked in the Memphis area from approximately 1977 on with the US Geological Survey, and in that collaboration I had been involved with groundwater modeling and practical problems that related to movement of water underground in the shallow aquifers, the Memphis Sand and the deeper aquifer.

* * *

[pp. 11-12]

Q. Specifically relating to the sand aquifer?

A. Yes, yes.

Q. Memphis Sand Aquifer?

A. Yes, yes.

* * *

[p. 17]

Q. Are you currently still with the USGS?

A. I'm classified as a research scientist emeritus.

* * *

[pp. 26-27]

Q. [W]ere these studies . . . related more to water quality or contamination issues?

A. They were also interested in the volume of water, quantity . . . .

Q. [W]hat you mean by the "volume of water, quantity," . . . . [?]

A. The assessment of groundwater is based on . . . balancing water budgets. And a water budget is composed of water that infiltrates the surface, that moves vertically downward. Some moves horizontally through the permeable layers of the rock.

Then there is also a component of water volume that is stored within the openings or the voids in the sands of the Memphis Aquifer.

* * *

[pp. 30-31]

Q. What is meant by the term steady-state equilibrium?

A. Steady-state equilibrium is a modeling term. It means that the rates of change are not varying . . . "steady state" means . . . an equilibrium in a simple terms.

Q. [C]an you describe what an equilibrium in the context of . . . a mass of water like the Memphis Sand Aquifer . . . mean[s] . . . ?

A. Equilibrium means the amount of water that is coming in is the same as the amount that is going out and that the gradients . . . the water table . . . are at a state that is, even though they may be still declining, it is a level, steady state or linear relationship . . . .

Q. [C]ould you explain what you mean in relation to the Memphis Sand Aquifer as a groundwater budget?

* * *

[p. 32]

A. Okay. The components of the groundwater flow budget include -- I'll draw an analogy to our checkbooks, how much money do we earn. That's the

amount coming in. That is recharge, that is water that is moving in any kind of amount in versus the amount that goes out. . . . And you need to also consider how much is in storage, how much money you had in your banking account before you started. And you can balance that.

* * *

[pp. 33-37]

Q. So if I had to visualize this aquifer . . . containing groundwater, what would it look like in steady-state equilibrium?

A. The aquifer itself is in a trough. Beneath the trough there are deep rocks that have been fractured and dropped down. They were filled in with these sands and clays. . . It is a thick sequence . . . .

* * *

A. [In] the Memphis Sand Aquifer . . . water flows naturally from points of input or recharge locations to discharge locations, natural discharge locations . . . Most of the water . . . at least initially prior any pumping or any modification under a steady state condition, the water came out in areas underneath in Arkansas . . . .

Q. When you use the word "flow" . . . , would you describe what kind of flow are you talking about?

* * *

A. The proper term in groundwater terminology, "laminar" flow means the water is moving -- it defines "laminar" as one end member. "Turbulent flow" is another. A river flows with turbulent flow because of high velocities. Most groundwater velocities typically are much slower than surface water.

* * *

Q. Are you familiar with the velocity of the flow in the Memphis Sand Aquifer?

A. Yes.

* * *

Q. What is . . . the speed at which the Memphis Sand Aquifer actually flows . . . ?

* * *

Q. I've heard numbers like an inch a day. Would that be a fair statement of the velocity at which generally the water moves in the Memphis Sand Aquifer?

* * *

A. An inch per day with 365, that's three feet a year.

* * *

A. . . . I think it is on the order of three feet per year, some of the slower velocities, that could be.

Q. [I]f I were to try to visualize or see the movement of this water in the sands . . . -- would it be perceptible.

* * *

A. [N]o, it would not be perceptible to human capabilities.

* * *

[pp. 42-43]

Q The "cone of depression" . . . Define that, please, sir.

* * *

A. It . . . is created by constructing a well . . . open to the sand layers. Speaking specifically for the Memphis Aquifer, you pull water out of storage in the well . . . So you have lowered the water level in the well . . . . The cone of depression . . . will go down to a sharp cone shape, a three-dimensional shape. It gets steeper near the well . . . . That cone of depression is what pulls the water. It drives the water into the well.

* * *

[p. 44]

Q. Is that just a function of gravity and pressure?

A. Gravity and pressure drive the flow of groundwater, that's correct.

Q. So any water that surrounds the cone will inexorably flow into the cone?

A. Yes.

Q. Or be drawn into the cone?

A. Yes, it will be drawn . . . .

* * *

[p. 45]

Q. Are you familiar with the fact that there is a cone of depression that . . . centers in Memphis and extends outward into Shelby County and DeSoto County, Mississippi?

A. The drawdown from Memphis, yes, yes.

* * *

[p. 46]

Q. [I]f the cone of depression extends into DeSoto County, Mississippi, from pumpage within the Memphis area, water from Mississippi is flowing into the Memphis area?

A. That's correct.

* * *

[pp. 90-91]

Q. I'm going to read the last paragraph of that page in the record and I'll ask you to explain what this means[:] "From 1886 to 1975 pumpage at Memphis had drawn down the original potentiometric surface by as much as 150 feet in the major pumping center and reversed the original gradient, which was to the

west . . . Flow that moved through the area toward natural discharge points to the south and west before 1886 is now diverted and captured by pumpage at Memphis." Do you see that?

A. I do.

Q. What does it mean that the pumpage from Memphis for the period from 1886 to 1975 had drawn down the original potentiometric surface?

A. The original water table, the non-pumping water table, had sloped toward the west . . . when you start pumping, you superimpose the cone of depression, and you capture water, and that's how water comes in.

* * *

[pp. 95-97]

Q. When you say the drawdown in these well fields had reversed the original gradient . . . what does that mean?

A. That means that the water surface, when it was originally going . . . from the east, the flow was across toward the west, and when you pull the water level down, it is -- there was a gentle slope toward the west. The pulling that water level down by pumping has caused the gradient to be reversed . . . .

* * *

Q. What does the word "diverted" mean?

* * *

A. That means the flow has been changed.

* * *

Q. Then when you state that it is being captured by pumpage at Memphis, what does that mean?

A. That means if the water level is lower . . . the flow follows that elevation at that surface, that potentiometric surface, and you have changed the direction into the pumping centers into the well, into the well fields.

Q. So that it [is] now flowing into the Memphis well fields?

A. Yes.

* * *

[p. 122]

Q. What does that document depict?

A. It depicts the water level of the Memphis Sand . . . .

* * *

Q. Does that document reflect the cone of depression that we've alluded to earlier?

A. It does.

Q. Does the document show the cone of depression extending across the Tennessee-Mississippi border into DeSoto County, Mississippi?

A. It does.

* * *

[p. 130]

Q. [Referring to an exhibit] . . . it states "Should Memphis ever need a source of water to supplement as present supply, the Mississippi River passes by its doorstep carrying tremendous volumes of water." Do you see that?

A. I do.

Q. Were you ever called upon to study the use of Mississippi River water as a source of supply for the City of Memphis, Memphis Light, Gas & Water Division?

A. No.

* * *

[p. 132]

Q. Is it fair to say that MLG&W is the largest pumper of groundwater in the Memphis area?

A. Yes.

Q. The arrows depicted on that document, what do they show?

A. They show flow directions.

Q. Are there arrows on the document marked as Exhibit 15 to your deposition depicting flow of water from the State of Mississippi into the Memphis metropolitan area? Do you see arrows that would --

A. I do.

Q. So there is water flowing, according to that chart, from Mississippi into Memphis?

A. That's correct.

* * *

[pp. 135-137]

Q. There is a reference to flow direction on that document in relation to the Memphis Sand Aquifer, is there not?

A. There is.

Q. What does it say?

A. "Into pumping center."

Q. What does that mean?

A. That means that the water . . . flows into the main pumping well fields of the area, the Memphis metropolitan area.

Q. Which would include MLG&W's well fields, correct?

A. It would include MLG&W's well fields . . . .

* * *

Q. Now . . . as a result of pumping in your study did you determine that as a result of pumping that the flow path had changed from its natural course?

A. Yes.

Q. What was the nature of that change?

A. . . . The flow was across from the southeast toward the northwest, and with the inclusion of pumping, there was a creation of a cone of depression around the major centers of pumping . . . .

* * *

Q. When you prepared your work product for your three-dimensional model, in the course of that work did you determine that water was flowing from the south into the cone of depression northward into the Memphis pumping centers?

A. Yes.

* * *

[pp. 162]

Q. (BY MR. CAMERON) I'll ask you to identify that document for the record, please, sir.

A. This is the potentiometric map of the Memphis Sand in the Memphis area, Tennessee, August, 1978, by David Graham. It is a Water Resources Investigation Open-file Report 79-80.

* * *

[pp. 165]

Q. Does this map, potentiometric surface map, reflect the cone of depression resulting from pumpage in the Memphis area?

A. It does.

* * *

[p. 166]

Q. Does the potentiometric map show the Tennessee-Mississippi boundary?

A. This does.

Q. Does it show the cone of depression expending extending across the Mississippi-boundary?

A. The 200-foot contour line closes across the Mississippi-Tennessee boundary, yes.

* * *

[pp. 172-173]

Q. Who funded the modeling report which is marked as Exhibit 10 to your deposition?

A. The City of Memphis, Memphis Light, Gas & Water Division, the US Geological Survey Water Resources Division, and Tennessee Department of Environment & Conservation . . . .

* * *

Q. [W]hat is achieved by groundwater modeling[?]

A. Groundwater modeling is a tool to take physical laws, in this particular case the physics of water flow, and looking at boundary conditions, looking at factors that influence those, try to develop a water budget, try to evaluate what water levels will be with respect to pumping a particular set of wells or stresses, putting stresses on a system and evaluating what those responses are . . . If a model is done correctly, we should be able to reproduce how much water was pumped.

* * *

[pp. 174-175]

Q. Did you follow standard groundwater model development protocols in the preparation of . . . Exhibit 10?

A. I did.

* * *

Q. They would be described in your report?

A. They are described in the report . . . We measure water levels because the water levels are very important. Those are the effect of human impact in an area. So water-level measurements is important. We do a compilation of the pumping, of the human stresses that are induced in an area . . . All of those

influence the overall cone of depression or the impact of utilizing a natural system.

* * *

[p. 177]

Q. [W]hat is meant by "conceptual model setup"?

A. A conceptual model is . . . a mind picture . . . . [A] conceptual model will be involved with what are the major controlling influences.

* * *

[p. 178]

Q. Or . . . a major stress, like pumpage?

A. Pumpage . . . the pumping centers are part of your conceptual model.

* * *

[pp. 179-180]

Q. This is a simulation . . . of the Memphis Aquifer layers in the Memphis Aquifer. Is this what you are referring to in the grid?

A. Very closely spaced, that's correct.

Q. But the actual study area is the smaller area labeled "Memphis Area"?

A. Yes . . . that's the Memphis metropolitan area around Shelby County . . . Desoto County. That is the area that was the main focus of the people who -- MLG&W was paying for the project . . . . So I . . . focused the results on what was called the Memphis area.

* * *

[p. 202]

Q. Would . . . it be possible to take the contours that are depicted on your Figure Number 7 and do sort of a rough flow net analysis to show the direction of flow and to quantify the volumes?

A. Yes.

* * *

[p. 203]

Q. What direction is it flowing from DeSoto County into Shelby County?

A. From DeSoto County it is flowing . . . toward the northwest.

Q. Into the MLG&W pumping centers?

A. Into the pumping center of metropolitan Memphis.

* * *

[p. 205]

Q. What about with regard to Figure 26 on Page 43 . . . of Exhibit 10?

A. Yes, Figure 26 Exhibit 10.

Q. It flows more northerly?

A. Yeah.

Q. That one that you have just drawn is flowing almost northward?

A. It is almost flowing north, yes.

* * *

[p. 206]

Q. Out of Mississippi into the Memphis area?

A. It is flowing, yes, from Mississippi into the Memphis area.

* * *

Q. And it demonstrates, does it not, based on the flow lines you've just drawn, that water, groundwater, in fact was flowing from Mississippi into the Memphis well fields?

A. There is water . . . moving into the Memphis metropolitan area.

Q. Is that a result of pumpage?

A. Yes.

* * *

[pp. 212-213]

Q. (BY MR. CAMERON) To your knowledge, Dr. Brahana, has MLG&W ever taken any steps whatsoever to reduce the cone of depression so that it would not extend into the State of Mississippi?

A. I don't know the answer to that. I do not know of any.

* * *

Q. (BY MR. CAMERON) To your knowledge, were the deleterious effects you referred to earlier in relation to the aquifer, did those include quantity issues that may arise as between the State of Mississippi and the City of Memphis?

* * *

MR. DAVID BEARMAN: Based on his knowledge from when he was working with the USGS, is that your question? That's fine.

* * *

[p. 214]

Q. Can you identify any specific action taken by MLG&W to mitigate the cone of depression?

* * *

A. I cannot name specific cases . . . So no.

APPENDIX K

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF MISSISSIPPI
DELTA DIVISION

JIM HOOD, Attorney General, ex rel,)
THE STATE OF MISSISSIPPI, Acting)
for itself and Parens Patriae for)
and on behalf of the People of the)
State of Mississippi,)
)
Plaintiff,)
)
Vs. Case No. CIVIL ACTION 2:05CV32D-B)
(And Related Cases))
)
THE CITY OF MEMPHIS, TENNESSEE and)
MEMPHIS LIGHT, GAS & WATER DIVISION,)
)
Defendants.)
)

THE DEPOSITION OF DAVID LANGSETH
November 19th, 2007

BRIAN F. DOMINSKI, RPR, RMR
ALPHA REPORTING CORP.
COURT REPORTERS
Memphis, Tennessee 38103
(901) 523-9874

[p. 5]

DIRECT EXAMINATION BY MR. CAMERON:

Q. Would you please state your name for the record.

* * *

A. David Langseth.

* * *

[p. 6]

Q. (BY MR. CAMERON) What is your profession, Mr. Langseth?

A. I'm a consulting engineer.

* * *

[p. 7]

Q. You've been retained as a testifying expert witness by the defendants, the City of Memphis and Memphis Light, Gas & Water Division, correct?

A. That's correct.

* * *

[p. 17]

Q. What were you asked to do in relation to this litigation?

A. The overall scope . . . was to evaluate the characteristics of the aquifer in question here and the impact of pumping . . . .

* * *

[pp. 70-71]

Q. Do you deny that there has been water that has moved as a result of the cone of depression underlying Memphis from and caused by MLG&W pumping . . . do you deny there has been water that has crossed the boundary from Mississippi into the Memphis area?

* * *

A. . . . I am not denying that pumping in the Memphis area, specifically by MLG&W, has changed the rate at which water is crossing the state boundary line . . . .

Q. [D]o you deny that water is crossing the state border from Mississippi into Memphis as a result of pumping?

A. No, I do not deny that some of the water crossing the border is due to the impacts of pumping.

* * *

[pp. 72-73]

Q. But in that opinion you do not, do you, sir, deny that there has been cross-boundary flow from Mississippi into Memphis?

A. . . . no, I do not deny that pumping by MLG&W has influenced the amount of water crossing the border.

* * *

[pp. 78-79]

Q. You . . . were asked to evaluate the availability of groundwater in the State of Mississippi, right?

A. That's correct.

Q. What specifically were you asked to do in that context?

* * *

A. Well . . . it really means whether or not the pumping by MLG&W has influenced the availability of groundwater to people who want to pump it out of the ground in the State of Mississippi.

Q. These two areas, to evaluate the impact of pumping by MLG&W . . on the aquifer dynamics and availability of groundwater in the State of Mississippi, was that the primary initial task that you identified earlier as being the scope of . . . your role in this litigation?

A. That is the primary area . . . .

* * *

[p. 81]

Q. [W]hen you are talking about "aquifer dynamics," what aquifer are you talking about?

A. The overall review includes the entire Mississippi Embayment Aquifer System, but certainly the focus of this work was then on the Memphis Sands Aquifer . . . .

* * *

Q. Yes, that you consider to be the focused area.

A. Well, the focus area is certainly up in Northern Mississippi, Western Tennessee . . . .

* * *

[pp. 87-89]

Q. Does pumpage in south Mississippi affect the cone of depression that underlies Memphis and DeSoto County?

A. When you ask me is pumping in South Mississippi associated with the cone of depression in some other location, the answer is no. . . .

* * *

Q. So pumping in the south part of Mississippi or in Northern Louisiana does not affect the cone of depression in the Memphis area, correct?

A. . . . pumping by any wells outside of that set of wells you just defined does not affect the cone of depression for the wells that you defined as being part of the wells you are evaluating the cone of depression for.

* * *

[pp. 90-92]

Q. You talked about the fact that you evaluated pumping and the existence of cones of depression in various parts of the Mississippi Embayment, right?

A. That's correct.

Q. And you evaluated pumping in Tennessee, right?

A. That's correct.

Q. And in Arkansas?

A. That's correct.

Q. And in Mississippi?

A. That's correct.

Q. What about Illinois?

A. I don't recall if the model domain goes up to Illinois and whether or not we have pumping in Illinois or not. It may have.

Q. What about Kentucky, how about that?

A. To the best of my recollection, there was some pumping in Kentucky.

Q. Louisiana?

A. I don't think our model domain extended down into Louisiana. That's for the numerical model. I certainly looked in my broader evaluation at pumping in Louisiana.

Q. What about Missouri?

A. To the best of my recollection, there was some pumping in the model domain in Missouri.

Q. Is there any impact or overlap between the cones of depression you evaluated in Kentucky and the cone of depression in the Memphis area?

A. I didn't evaluate that specifically . . . .

Q. Is there any relationship or overlap between the cone of depression or cones of depression you evaluated in Arkansas and the cone of depression in the Memphis area?

A. I didn't do an evaluation that would allow me to say specifically whether there is an overlap between those two.

* * *

[p. 93]

Q. Is it possible to evaluate a specific sub-area of the Mississippi Embayment?

A. Yes, it is . . . .

* * *

[p. 164]

Q. Does pumping in Southern Arkansas or Northern Louisiana affect the cone in the Memphis/DeSoto area? . . . Does it affect the water levels in the Memphis/DeSoto area?

A. I haven't done an evaluation to know if the impacts of that pumping extend all the way to the Memphis area.

APPENDIX L

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF MISSISSIPPI
DELTA DIVISION

JIM HOOD, Attorney General, ex rel, THE STATE OF MISSISSIPPI, Acting for itself and Parens Patriae for and on behalf of the People of the State of Mississippi,

Plaintiff,

Vs. Case No. CIVIL ACTION 2:05CV32D-B (And Related Cases)

THE CITY OF MEMPHIS, TENNESSEE and MEMPHIS LIGHT, GAS & WATER DIVISION,

Defendants.

THE DEPOSITION OF JOHN B. ROBERTSON
November 27th, 2007

BRIAN F. DOMINSKI, RPR, RMR
ALPHA REPORTING CORP.
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Memphis, Tennessee 38103
(901) 523-9874

[p. 7]

DIRECT EXAMINATION BY MR. CAMERON:

Q. Good morning . . . You are John B. Robertson, correct?

A. That's correct.

* * *

Q. What is your profession?

A. I am a hydrogeologist and environmental scientist.

* * *

[p. 9]

Q. [Y]ou have been retained as an . . . expert witness on behalf of the defendants in this cause, correct?

A. That's correct.

* * *

[pp. 31-32]

Q. Are you generally familiar with the claims of the State of Mississippi?

A. General in general, yes.

Q. Are you aware that the State of Mississippi claims that Memphis through pumping by MLGW has caused

water to be -- groundwater to be diverted from the State of Mississippi into the Memphis area?

A. Yes. I'm aware that's the claim.

Q. What geographical area would be your understanding that would be encompassed -- in other words, what geographical area do you believe to be the focus of the claims of the State of Mississippi?

A. Northern Mississippi and the Memphis area in general of Tennessee . . . .

Q. But Western Tennessee, Northwest Mississippi?

A. That's the focus of the Mississippi claim as I understand it.

* * *

[p. 33]

Q. [D]oes pumpage in Northern Louisiana affect the water levels in the Memphis area?

A. It can.

Q. Does it according to the study that you've done?

A. We didn't do an assessment of that, of pumpage in Louisiana.

* * *

[p. 34]

Q. So does pumpage in Kentucky affect the water levels in Memphis?

A. It would have some effect.

Q. Did you quantify the effect of the pumpage in Kentucky on water levels in the Memphis area?

A. We did not specifically quantify that . . . .

Q. Can you define . . . right now what the effect of pumpage in Kentucky is on the water levels in the Memphis area?

A. I cannot . . . .

* * *

[pp. 36-38]

Q. . . . you can't tell me, can you, quantitatively what the effect of pumpage in Missouri is or has been on the Memphis are?

A. No, I cannot.

Q. With regard to pumpage in Alabama, does pumpage in Alabama have any effect on water levels in the Memphis area?

A. It probably has some effect.

Q. But sitting here today, you can't tell me what that effect is quantitatively, can you?

A. No.

Q. Does pumpage in Illinois have any effect on the water levels in the Memphis area? . . . [Y]ou can't tell me what the effect is sitting here today, can you sir?

A. No.

Q. With regard to pumpage in South Mississippi . . . .

* * *

Q. Can you tell me today quantitatively what the effect would be of pumpage in South Mississippi on the water levels in Memphis?

A. No, I can't.

* * *

[p. 39]

Q. Is there pumpage of groundwater in East Tennessee?

A. There probably is but not from this aquifer system.

Q. Is there any pumpage in Central or East Tennessee that impacts the water levels in the Memphis area?

* * *

[pp. 40-41]

A. No . . . I wouldn't expect it to have an effect.

Q. Now, you mentioned Eastern Arkansas. Does the pumpage in Eastern Arkansas have any effect on the water levels in the Memphis area?

A. Yes.

Q. Okay. Have you quantified that effect?

A. I have not.

* * *

[p. 49]

Q. What is the order of magnitude of drawdown impact that reaches the Memphis area from northern Louisiana or Arkansas?

A. I haven't made an assessment of that.

* * *

[p. 50]

Q. So can you tell me what the impact is of pumpage in Northern Louisiana or Eastern Arkansas on the Memphis area?

A. I cannot specifically because that wasn't separated out.

* * *

[pp. 50-51]

Q. [D]o you deny that there is a cone of depression underlying Memphis and extending into the State of Mississippi?

A. No.

* * *

Q. (BY MR. CAMERON) Is there not a cone of depression underlying Memphis that extends into the State of Mississippi?

A. I would say under my review that there is a cone of depression that extends into the northern part of Mississippi.

Q. And isn't it true that that cone of depression has been created and expanded in large part as a result of the pumpage of MLG&W?

A. Well, MLG&W is a major contributor to the drawdown that causes that cone of depression.

Q. Isn't it a fact that MLG&W is the largest pumper in the Memphis area of groundwater from this aquifer system?

A. That's correct.

* * *

[pp. 58-59]

Q. In your work in this case did you do any analysis of any changes in flow direction from Mississippi into the Memphis area as a result of the cone of depression we're discussing?

A. . . . we did a significant amount of modeling of the cone of depression and the effects of all the pumping in the area on flow directions.

Q. Did that analysis demonstrate and confirm that water, groundwater, originating from beneath Mississippi is moving into the Memphis area as a result of MLG&W pumpage?

A. It did indicate that there was MLG&W pumpage that caused an increase in flow into the Memphis area from Northern Mississippi.

* * *

[p. 103]

Q. There is a cone of depression that has resulted in large part from MLG&W pumping that extends from Memphis into Mississippi, correct?

A. Into Northern Mississippi.

Q. That's right. You've agreed to that, right?

A. Yes.

* * *

[pp. 106-108]

Q. (BY MR. CAMERON) Does MLG&W pumpage cause water in the aquifer that is drawn from beneath Mississippi to move into the Memphis area?

A. . . . the answer is yes, the pumpage causes a cone of depression that allows water to move north.

* * *

Q. What does that depict? [Reference to a diagram from Mr. Robertson's expert report]

A. It is a schematic diagram illustrating the concept of a cone depression and movement of water towards a pumping well.

Q. Does the groundwater in the cone of depression get pulled towards a well, the pumping well?

A. Yes.

Q. In a cone of depression, does the water get pulled towards the steepest part of the cone?

A. It gets pulled towards the center of the cone. The center of the cone is generally the steepest part.

Q. Does the groundwater speed up as it moves towards the steepest part of the cone?

A. Yes.

* * *

Q. As to the regional cone of depression, is the steepest part of that cone within Shelby County?

A. Yes.

* * *

[p. 110]

Q. [B]ecause of the cone of depression is the water pulled into the groundwater system beneath Shelby County that would have normally been beneath DeSoto County?

A. Well, yes, it would have been beneath . . . DeSoto County . . . .

Q. But for the MLG&W pumpage, right?

* * *

[p. 111]

A. The direction that it moved was changed because of the pumpage.

Q. So MLG&W pumpage does affect the pathway by which water departs Mississippi, correct?

* * *

A. It does affect the pathway of some of the water, yes.

* * *

[pp. 152-154]

Q. To your knowledge, has MLG&W considered any alternative water supply sources other than the Memphis Sand Aquifer?

A. I don't know.

* * *

Q. Are you aware of whether or not MLG&W has considered any alternative supply facilities other than the existing system?

A. I'm not aware.

Q. Are you aware of whether or not MLG&W has made any cost analyses regarding alternative supply facilities or systems?

A. I don't know one way or the other.

Q. Have you asked for any information regarding alternative supply systems or facilities . . . ?

A. No, I have not. This opinion is based primarily on past practices.

Q. Past practices?

A. Past and current practices.

Q. Past and current practices of MLG&W?

A. Yes.

Q. Is it your testimony today that those past and current practices have not involved any consideration of alternative supply, water supply sources or facilities?

A. I don't know . . . I was looking at how they were managing their current and past resource that was their water supply, which is the Memphis Sand Aquifer.

Q. And so are you saying that the current and past water supply did not involve to your knowledge any consideration by MLG&W of alternative sources or facilities?

A. I don't know whether they did or not . . . .

Q. So you don't know whether MLG&W ever considered the use of surface water such as the Mississippi River for water supply?

A. I don't know.

Q. And you don't know whether MLG&W ever considered relocation of some of its well fields?

A. I don't know.

* * *

[pp. 159-160]

Q. Has MLG&W ever exercised a conscientious effort to take steps to eliminate or mitigate the cone of depression underlying Memphis and extending into Mississippi?

* * *

A. I don't know of any efforts that MLG&W has done to reduce the cone of depression . . . .

* * *

[p. 161]

Q. (BY MR. CAMERON) So has MLG&W made any conscientious effort based on your review and your professional judgment to take steps to change the configuration of the cone of depression so it no longer extends into the State of Mississippi?

A. Not that I know of.