DAUBERT, GROUNDWATER CONTAMINATION, AND THE FUTURE OF FRACKING LITIGATION

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Introduction

Hydraulic fracturing or "fracking" is a technique of natural gas extraction that has been used in the oil and gas industry for over sixty years. Fracking involves pumping millions of gallons of water, sand, and other fracking fluids underground to break apart shale formations and to release natural gas. In 2009, numerous lawsuits emerged alleging various forms of personal and economic injuries resulting from hydraulic fracking operations. To date, approximately fifty such lawsuits have been filed nationwide, including suits in Texas, Pennsylvania, Arkansas, Colorado, Louisiana, New York, and West Virginia.[1]

The vast majority of fracking lawsuits involve claims of groundwater contamination. In a typical fracking case, plaintiffs allege that defendants' fracking operations contaminated their water wells with fracking fluid and pollutants, including methane, ethane, barium, or other hazardous chemicals. Plaintiffs have alleged various theories of liability, including negligence, strict liability, nuisance, trespass, fraud, and breach of contract and violations of federal and state statutes related to safe drinking water, clean air, casing requirements, and deceptive trade practices. As this litigation matures, novel theories of liability and damages will likely emerge.

Fact discovery in most hydraulic fracking cases remains in an early stage. Therefore, an important next major step in this evolving litigation is the inevitable battles over experts under the rigorous standards set forth in *Daubert* and its progeny.[2] This article briefly explores the next critical stage in the development of fracking litigation, drawing on *Daubert* decisions in past groundwater contamination cases for guidance.[3]

Federal Rule of Evidence 702 and *Daubert*

Since the United States Supreme Court's seminal decision in *Daubert* almost twenty years ago, a litany of expert witnesses have been called to testify in federal court as to the alleged health and environmental impacts of groundwater contamination. Two prominent categories of experts have emerged in groundwater contamination cases: hydrological contamination experts and medical causation experts. Hydrological experts testify as to the presence and alleged causes of contamination. Medical experts testify as to whether the plaintiff's exposure to contamination caused or will cause physical injuries.

In federal court, the admissibility of expert witness testimony is governed by Federal Rule of Evidence 702, which states:

> 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.[4]

Rule 702 was amended to codify the Supreme Court's decision in *Daubert*.[5]

There are three general ways in which expert testimony can be challenged: (1) the witness is not qualified as an expert, (2) the testimony is not relevant, and (3) the testimony is not reliable due to its methodology or application. Federal courts may consider the following factors when ruling on a *Daubert* motion: (1) whether the technique was tested in actual field conditions, (2) whether the technique has been subjected to peer review and publication, (3) the known or potential rate of error, (4) whether standards exist for the control of the technique's operation, and (5) whether the technique been generally accepted within the relevant scientific community.[6]

The Cause of the Groundwater Contamination

The Experts and Their Techniques

Where the existence or cause of alleged groundwater contamination is in question, the most frequently utilized categories of experts are hydrologists, hydrogeologists (also referred to as geohydrologists) and environmental engineers. Hydrologists study the movement, distribution, and quality of water on earth. Hydrogeologists study the distribution and

movement of groundwater in soil and rocks. Environmental engineers develop environmental impact assessments.

Modeling

Hydrologists and hydrogeologists often base their opinions on MODFLOW projections that have been calibrated to a specific situation. MODFLOW is a computer program developed in late 1983 by the United States Geological Survey. MODFLOW simulates the flow of groundwater through aquifers. MODFLOW can predict the rate at which hazardous substances migrate and the volume of leakage into a water well. MODFLOW simulations can also estimate the size of a contamination plume in a reservoir. MODFLOW is sanctioned by the EPA, has been peer-reviewed, and is considered a standard modeling tool used by hydrogeologists.[7] However, MODFLOW provides only an analytical framework. To apply to any specific situation, the program must be calibrated accurately with the specific geological features of a location.

MODFLOW, when applied correctly, has been found to be a reliable methodology on which expert opinion may be based. In *Aero-Motive Company v. Becker*, a corporation sued its former operators, alleging that they were responsible for groundwater contamination that had occurred because of chemical waste leaks around the defendants' manufacturing plant.[8] To support its claim, the plaintiff offered a geological engineer who used historical information on the soil and groundwater, aerial photographs of the area, and employee deposition testimony about plant activities to develop a MODFLOW model of the groundwater contamination. The expert admitted that there are many variables that impact the accuracy of the model, including soil permeability and other hydrogeological factors. However, he verified the accuracy of the model by comparing the predicted result with actual field data and found that the model was consistent with actual measurements.[9]

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Defendants challenged the proffered expert on several grounds, including that the geological engineer failed to compute and document the rate of error for his calculations. Defendants contended there was no factual support for the conclusion that hazardous substances were disposed of during the relevant time period, rendering the testimony unreliable. Defendants also asserted that the geological engineer failed to consider other potential sources for the contamination at the site such as a leaking underground storage tank and plaintiff's degreasing operations at the plant.

The United States District Court for the Western District of Michigan disagreed, holding that "[t]hese are widely-used, well-tested particle-tracking models that have been subjected to peer review and are commonly accepted in the hydrogeologic community."[10] The Court further determined that plaintiffs' geological engineer "used tested, accepted methods in reaching his conclusions. He relied on published materials and reliable data in conducting his analysis. His opinions were not mere speculation or conjecture. His opinions are based on reliable scientific methods and knowledge and will be helpful to the trier of fact in resolving issues in this case."[11]

Modeling Predictions in Conflict with Actual Testing

One key pitfall for groundwater contamination experts is when the results of actual testing conflict with the results predicted by the expert's model. Parties are able to use this conflict to argue that, despite having a sound methodology, the expert's testimony should be excluded because the objective evidence indicates that the model is flawed.

Abarca v. Franklin County Water District highlights that a conflict between modeling predictions and actual testing results can be used to challenge an expert's groundwater model.[12] In *Abarca*, plaintiffs alleged that contaminants from a cooling tower manufacturing facility had migrated into private wells. Defendants objected to the admission of testimony from plaintiffs' proffered expert, a hydrologist and groundwater modeler, who testified that hexavalent chromium from the defendants' facility entered and contaminated the local well for at least a period of twenty-five years. Plaintiffs' proffered expert used a MODFLOW model derived from an earlier model that had been developed by an environmental consultant hired by the defendants.

Defendants moved to exclude the hydrologist's testimony on the ground that his opinions "ignore actual data in favor of unsupported modeling."[13] Defendants argued that the expert's model was objectively unreliable because historical actual measurements were not consistent with the result predicted by the expert's model. The expert appeared to have inappropriately ignored the potential implications of those historical measurements when constructing his model. The expert countered by offering reasons why those historical measurements should not have been taken into account by his model.

The court reached an impasse under *Daubert*. It was difficult to

determine whether defendants were challenging the results of the modeling – not grounds for exclusion under *Daubert* – or were casting doubt on the reliability of the expert's testimony. Ultimately, the court retained its own independent expert, who also disagreed with plaintiffs' expert's methodology.

In its ruling, the court found that "[a]lthough it is undisputed that modeling is not an exact science," a number of potentially troubling issues casting doubt on the reliability of the model had been raised. The court did not exclude plaintiffs' expert, but reserved "the right to exclude the model after hearing the evidentiary foundation for the model at trial."

Other courts have agreed that groundwater models can be challenged successfully when the results predicted by a groundwater model conflict with the results of actual testing. In *Ramsey v. Consolidated Rail Corp.*, plaintiff alleged that her liver was damaged by drinking well water contaminated by releases of hazardous substances at a nearby rail yard. In support of her claims, she offered the expert opinion of a hydrologist, whose groundwater model indicated that certain contaminants from chemical releases reached the plaintiff's well. However, twelve historical tests of the plaintiff's well had failed to reveal the presence of the alleged contaminant.

While much of the expert's methodology "passe[d] the *Daubert* inquiry with flying colors," the court was left with the problem that actual testing did not match the result predicted by the expert's model. Plaintiffs were essentially attempting to prove contamination based on a model that predicted contamination "despite lack of support in years of actual testing."

The Court ultimately excluded the expert's opinion, explaining that it simply could not overcome the fact that the actual analysis of the water samples demonstrated that the model was not reliable.

Considering All the Data

Even when not using a model, an expert's opinion may be demonstrably unreliable if the expert fails to consider data that conflicts with his or her opinion. In *LeClercq v. The Lockformer Company*, the plaintiffs alleged that their drinking water had become contaminated by chemical spills at the defendant's manufacturing plant.[14] In support, they offered the opinion of a hydrogeologist that various contaminants had traveled from defendants' facilities through a water treatment plant and leaked from an effluent line into the groundwater.[15] The United States District Court for the Northern District of Illinois, however, excluded all of the hydrogeologist's opinions as unreliable because he failed to consider certain material facts. In particular, the proffered expert failed to consider seventeen effluent samples that were negative for contaminants. His "failure to discuss the import of, or even mention, these material facts in his reports amounts to 'cherry-picking the facts he considered to render his opinion and such selective use of facts fail to satisfy the scientific method and *Daubert*.' This disregard of relevant data undermines the reliability of his entire opinion in this matter."[16]

Similarly, a lack of environmental testing or sampling may affect the reliability of an expert opinion. For example, an expert's failure to test other nearby industrial properties as a cause of PCB contamination played a role in the exclusion of a proffered expert in *Innis Arden Golf Club v. Pitney Bowes, Inc.*[17] In *Innis Arden*, a golf club discovered its property was contaminated with organic pollutants and sought reimbursement for the cleanup from the defendant. Innis Arden retained an environmental chemist and toxicologist who concluded that the remediation costs were caused by a release of PCBs from the defendant's property. The environmental chemist was challenged on various *Daubert* grounds, including that his causation opinion was unreliable because he had not tested other sites that the plaintiff recognized could be responsible for the PCBs. The United States District Court for the District of Connecticut agreed, "That another party could be responsible is not merely conjecture on Pitney Bowes's part: Innis Arden, its counsel . . . and even [plaintiff's expert] understood that the evidence did not point only to Pitney Bowes. Yet no other possibility was ever explored. Having accounted for no other explanations other than the one he ultimately 'proved,' [plaintiff's expert]'s methodology is not reliable."[18]

It is not always necessary for an expert to perform actual testing, however, and an expert's opinion may be admissible even if no testing was performed. In *Dolomite Products Co., Inc. v. Amerada Hess Corporation*, plaintiff filed suit seeking to recover costs associated with the assessment and remediation of groundwater contamination.[19] In particular, plaintiff alleged that the operation of a gas station caused or contributed to the contamination of plaintiff's property. Defendant challenged plaintiff's causation expert (a statistical modeler) on several grounds, including that the expert failed to take soil and groundwater samples. The United States District Court for the Western District of New York rejected the *Daubert* challenge, finding that the expert's experience and methodology satisfied Federal Rule of Evidence 702 and the defendants' criticisms were "better addressed on cross-examination."[20]

Medical Causation and Groundwater Contamination

Another type of expert commonly called to testify in groundwater contamination cases are medical professionals, such as toxicologists, epidemiologists, and oncologists. Toxicologists testify regarding the groundwater chemicals to which plaintiffs were allegedly exposed and whether such chemicals had a carcinogenic or otherwise negative impact on human health. Medical causation experts often examine the plaintiffs, determine their medical condition, determine the level of contaminant exposure, assemble relevant scientific literature pertaining to the contaminant and analyze data in existing studies, and conclude whether there was a causal link between the contaminant and the plaintiff's injuries. Successful *Daubert* challenges to medical causation experts generally undermine the reliability of the proffered expert's testimony.

One method of attacking the reliability of these experts' methodologies is to examine their analyses for baseless assumptions or conjecture. In addition, testimony can be excluded if the witness is shown to be seeking data to fit a preconceived conclusion rather than interpreting data objectively. In *Avilla v. Willits Environmental Remediation Trust*, plaintiffs' toxicologist tested the blood of four plaintiffs for the presence of multiple types of dioxin compounds.[21] Although eighty percent of the compounds were not detected, the toxicologist nonetheless assumed that they were present. Further, the expert also failed to eliminate other potential sources of dioxin exposure such as cigarettes and smoke inhalation. The Ninth Circuit affirmed the district court's exclusion of the toxicologist, noting that his conclusions had "no scientific support."[22]

Similarly, in *Cameron v. Peach County, Ga.*, plaintiffs sought damages for environmental contamination allegedly caused by the county's operation of a solid waste landfill.[23] Plaintiffs' toxicologist assumed that well users drank two liters of contaminated well water every day for sixteen years and breathed twenty liters of polluted air every day for over twenty-five years. The United States District Court for the Middle District of Georgia, however, excluded the toxicologist's opinion, finding his conclusions to be based on "mere conjecture" because "he did not inquire as to how long each resident actually lived adjacent to the landfill and merely assumed that the groundwater exceeded [maximum contamination levels] as far back as 1978."[24]

Conclusion

The upcoming battles regarding experts in fracking cases will turn undoubtedly on the standard *Daubert* challenges to the reliability of proffered experts' testimony, including whether the testimony is based on sufficient facts or data, whether the opinions are based on reliable principles and methods, and whether those methods are reliably applied. Two broad categories of experts will likely be proffered to testify in fracking litigation related to groundwater contamination. Hydrologists, hydrogeologists, environmental engineers, and statistical modelers will be used to establish whether plaintiffs' water wells became contaminated as a result of defendants' fracking operations. Medical experts, including toxicologists and epidemiologists, will be used to determine whether plaintiffs' alleged physical injuries were caused by defendants' fracking operations. If past groundwater contamination cases are any indication, then one lesson is clear: the reliability of these expert witnesses will have significant impacts on which parties prevail in the unfolding fracking litigation.

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1 The majority of plaintiffs are landowners who leased oil and gas rights, residents in close proximity to hydraulic fracking, environmental groups, and/or employees of companies involved in fracking. Not surprisingly, defendants have largely included oil and gas companies, well operators, drilling contractors, service companies, waste treatment operators, and compressor station operators.

2 *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579 (1993).

3 The majority of fracking cases are pending in federal court and therefore the *Daubert* standard will apply to those cases. The *Daubert* standard, however, governs the admissibility of expert testimony in federal courts only. Although some state courts may have adopted *Daubert* or *Daubert*-like standards, state law should be consulted to identify any differences for fracking cases pending in state court.

4 Fed. R. Evid. 702.

5 In 1999, the U.S. Supreme Court expanded the *Daubert* standard to non-scientific expert testimony. *See Kumho Tire Co., Ltd. v.*

Carmichael, 526 U.S. 137 (1999).
[6] *Daubert*, 509 U.S. at 592-594.
[7] *See, e.g., United States v. Dico, Inc.*, 266 F.3d 864, 870 (8th Cir. 2001).
[8] 2001 WL 1699191 (W.D. Mich. Oct. 2, 2001).
[9] 2001 WL 1698998 (W.D. Mich. Dec. 6, 2001).
[10] *Id.*, at *3.
[11] *Id.*, at *4.
[12] 761 F. Supp. 2d 1007 (E.D. Ca. 2011).
[13] *Id.* at 1045.
[14] 2001 WL 199840 (N.D. Ill. Feb. 28, 2001).
[15] 2005 WL 1162979 (N.D. Ill. Apr. 28 2005).
[16] *Id.*, at *4 (citation omitted).
[17] 629 F. Supp. 2d 175 (D.Conn. 2009).
[18] *Id.* at 189.
[19] 2004 WL 1125154 (W.D.N.Y. May 19, 2004).
[20] *Id.*, at *3.
[21] 633 F.3d 828 (9th Cir. 2011).
[22] *Id.* at 837.
[23] 2004 WL 5520003 (M.D. Ga. June 28, 2004).
[24] *Id.*, at *11.
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