UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

5/7/08

IN RE: METHYL TERTIARY BUTYL ETHER ("MTBE") PRODUCTS LIABILITY LITIGATION	**OPINION AND ORDER**
	Master File No. 1:00-1898
	MDL 1358 (SAS)
This document relates to:	**M21-88**
County of Suffolk, et al. v. Amerada Hess Corp. et al., 04 Civ. 5424	
United Water New York Inc. v. Amerada Hess Corp., et al., 04 Civ. 2389	

SHIRA A. SCHEINDLIN, U.S.D.J.:

I. INTRODUCTION

Methyl tertiary butyl ether ("MTBE") is a gasoline additive that has contaminated groundwater throughout the United States. One of the problems with MTBE is that it can make water undrinkable due to its turpentine-like taste and odor.[1] In this multidistrict litigation, three plaintiffs responsible for providing water to the public in the state of New York (Suffolk County Water Authority, the

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[1] *See* U.S. Envtl. Prot. Agency, *Achieving Clean Air and Clean Water: The Report of the Blue Ribbon Panel on Oxygenates in Gasoline* 13, 77 (1999) ("The turpentine-like taste and odor of MTBE . . . can make such drinking water unacceptable to consumers.") available at http://www.epa.gov/oms/consumer/fuels/oxypanel/r99021.pdf.

County of Suffolk, and United Water of New York) have sued various oil companies after their water became contaminated with MTBE.

At trial, plaintiffs propose to offer the expert testimony of Dr. William S. Cain to testify about the level at which people can perceive MTBE in their water because of its odor or taste. According to Dr. Cain:

> It is my opinion that MTBE can be detected by smell and/or taste in drinking water at levels at or below 1 part per billion (ppb). At concentrations at or below 1 ppb, MTBE can impart a distinctive taste and odor to water.[2]

Defendants have filed a motion *in limine* to exclude Dr. Cain's testimony on the ground that it does not satisfy the requirements of Rule 702 of the Federal Rules of Evidence for expert testimony.[3] In particular, defendants argue that Dr. Cain's

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[2] 2/1/07 Expert Report of William S. Cain, Ph.D. ("Cain Report") at 2. *See also* 5/25/07 Expert Report of William S. Cain, Ph.D. – Rebuttal at 1 ("Cain Rebuttal") ("As I stated in my First Report, to assert my opinions, I have reviewed various studies of how well human beings can perceive the odor and flavor of weak concentrations of MTBE in water. I have concluded that more than one existing study can be interpreted as supporting a conclusion of detection of the material at or below 1 part per billion (1 ppb). Nothing in the McGuire Report changes my opinions and conclusions.").

[3] *See* Defendants' Notice of Joint Motion and Motion *In Limine* to Exclude the Opinion of Plaintiffs' Expert William S. Cain, Ph.D. ("Def. Mem."). The motion *in limine* is filed pursuant to Rule 104. *See* Fed. R. Evid. 104(a) ("Preliminary questions concerning the qualification of a person to be a witness, the existence of a privilege, or the admissibility of evidence shall be determined by the court, subject to the provisions of subdivision (b) . . . .").

testimony is not "the product of reliable principles and methods."[4] For the reasons below, defendants' motion is granted.[5]

II. BACKGROUND

A. MTBE Contamination of Water

MTBE "is an oxygenate, meaning it increases the oxygen content of the gasoline. It is also a source of octane in gasoline."[6] Companies began to add MTBE to gasoline in 1979,[7] and "[t]he use of MTBE significantly increased after 1990, when Congress established the Reformulated Gasoline Program ('RFG Program') as part of its amendments to the Clean Air Act ('CAA')."[8] As enacted in 1990, "the RFG Program required the use of reformulated gasoline containing at

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[4] Fed. R. Evid. 702.

[5] Dr. Cain has also submitted two reports that apply his taste/odor threshold to determine which wells have been damaged. *See* 5/8/07 Expert Report of William S. Cain, Ph.D. - Well Specific Opinions ("Well Specific Rpt."); 8/23/07 Supplemental Expert Report of William S. Cain, Ph.D. – Well Specific Opinions. Because these reports merely apply Dr. Cain's inadmissible opinion to specific wells, these opinions are also inadmissible.

[6] Methyl Tertiary-Butyl Ether (MTBE): Advance Notice of Intent to Initiate Rulemaking Under the Toxic Substances Control Act to Eliminate or Limit the Use of MTBE as a Fuel Additive in Gasoline ("MTBE Advance Notice of Intent"), 65 Fed. Reg. 16,094, 16,094 (Mar. 24, 2000).

[7] *See* Application for Methyl Tertiary Butyl Ether, Decision of the Administrator, 44 Fed. Reg. 12,242, 12,243 (Mar. 6, 1979).

[8] *In re MTBE*, 488 F.3d 112, 114 (2d Cir. 2007).

least 2 percent chemical oxygen by weight in certain metropolitan areas with high summertime smog levels."[9] "Pursuant to regulations promulgated by the Environmental Protection Agency ('EPA') in 1991, MTBE is one of several different oxygenates that may be used to certify gasoline as reformulated."[10]

"Each year approximately 9 million gallons of gasoline (the equivalent of a full supertanker) are released to the environment in the United States from leaks and spills, according to an estimate by the Alliance for Proper Gasoline Handling."[11] Gasoline is released into the environment primarily through leaking underground storage tanks, leaking product pipelines, gasoline spills, and exhaust.[12]

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[9] *Id.*

[10] *Id.*

[11] MTBE Advance Notice of Intent at 16,095.

[12] *See In re MTBE*, 209 F.R.D. 323, 330 n.5 (S.D.N.Y. 2002) ("A government study conducted over an eight-year period from 1993-2000 concluded that releases from underground gasoline storage systems ['USTs'] are the main source of MTBE groundwater contamination."); *In re MTBE*, 241 F.R.D. 185 (S.D.N.Y. 2007) (discussing a leaking underground tank in Maryland); *In re MTBE*, 241 F.R.D. 435 (S.D.N.Y. 2007) (discussing a pipeline that released thousands of gallons of gasoline in Illinois); *In re MTBE*, 342 F. Supp. 2d 147, 149 (S.D.N.Y. 2004) ("Water contamination occurs from normal, everyday use of gasoline containing MTBE–*e.g.*, gasoline drips from gas station pumps–and when MTBE is stored in leaking underground tanks. MTBE is also discharged into the air as exhaust as a bi-product of car engine combustion of gasoline containing MTBE.").

In comparison with other gasoline components, MTBE dissolves easily in water and does not bond well to soil. As a result, once gasoline with MTBE is released into the environment, the chemical travels rapidly and has the ability to contaminate groundwater and underground water reservoirs. MTBE contamination can give water a foul taste and odor, rendering it unfit for human consumption.

B. Potential Damage to Plaintiffs' Water Supplies

After discovering that their water supplies were contaminated with MTBE, plaintiffs sued various companies for their use and handling of the chemical. In particular, "plaintiffs assert claims for: (a) violation of section 8(e) of the Toxic Substances Control Act ("TSCA"); (b) public nuisance; (c) strict liability for design defect; (d) strict liability for failure to warn; (e) negligence; (f) private nuisance; (g) violation of New York's General Business Law; (h) violation of New York's Navigation Law; and (i) trespass."[13]

If the jury should find defendants liable for these claims, it will determine the extent to which MTBE harmed plaintiffs' water supplies. In particular, plaintiffs are harmed when a reasonable owner would begin to remove the MTBE from its water, or otherwise take appropriate action (*e.g.*, masking the

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[13] *In re MTBE*, 517 F. Supp. 2d 662, 665 (S.D.N.Y. 2007).

taste and odor with chlorine), because of the taste and odor it gives contaminated water.[14]

In determining the harm inflicted on plaintiffs, two points deserve emphasis. *First*, as a matter of law, plaintiffs' water is not harmed merely because its water contains a minuscule amount of MTBE. As this Court has previously explained:

> even clean, clear, good-tasting water contains dozens of contaminants at low levels. On its journey through the water cycle as rain, surface water, and groundwater in an aquifer, water collects many contaminants of various types: bacteria, parasites, heavy metals, organic compounds (including MTBE), inorganic compounds, and even radioactive substances.[15]

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[14] Plaintiffs could been harmed in other ways, which this opinion does not address. For example, the costs of investigation could constitute a harm. In addition, the water could be harmed for reasons that do not involve taste or odor. For example, if MTBE were found to cause cancer, or even suspected of causing cancer, it might require the removal of the chemical from the water. It should be noted that the studies on the effects of ingesting MTBE are sparse. *See* U.S. Envt'l. Prot. Agency, *Oxygenates in Water: Critical Information and Research Needs* 24 (1998) ("Most of the testing and research on the toxicity of oxygenates has been concerned with the effects of *inhaled* MTBE in laboratory animals and human volunteers.") (emphasis in original) available at http://www.epa.gov/ncea/pdfs/oxy_h2o.pdf. However, new studies on the effects of MTBE, which may include the effects of ingestion, may be published in the future. *See In re MTBE*, 241 F.R.D. 435, 437 (S.D.N.Y. 2007) ("The United States Environmental Protection Agency may have found that MTBE is a 'likely' cause of cancer in humans such as leukemia and lymphoma, although this conclusion has not yet received official agency approval.") (citations omitted).

[15] *In re MTBE*, 2007 WL 1601491, at *6 (S.D.N.Y. June 4, 2007).

New York does not have a zero-tolerance policy on contaminants in drinking water. "Indeed, the costs associated with a zero-tolerance rule make such a rule impracticable."[16]

Second, the fact that one person in the population can taste or smell MTBE does not mean that plaintiffs' water supplies have been harmed because it would be unreasonable for a water company to cater to the most sensitive person in the population. People have different abilities to taste or smell MTBE just as they have different abilities to taste or smell any substance.[17] As a result, some people may be able to perceive it at much lower levels than other people but this fact alone does not necessarily mean that plaintiffs' water supply has been harmed.

The jury must consider the variation in the population's ability to detect MTBE when determining the extent to which plaintiffs have been harmed. For example, it is conceivable that a jury would conclude that a reasonable company would not take steps to remove MTBE from the water if only 0.1%, 1%,

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[16] *Id.*

[17] For example, some research indicates that about twenty-five percent of the population qualifies as a "supertaster" – an individual with significantly more sensitive taste receptors. *See* David Leite, "Tales of a Supertaster," *Best Food Writing 2006* 58, 59 (Holly Hughes, ed. 2006) (discussing the work of Linda Bartoshuk, Ph.D., who researches genetic variation in taste perception at Yale University's School of Medicine).

10%, or even 25% of the population found it unpleasant to drink depending on the particular circumstances of the case.

In the end, the issue of when the water suppliers are harmed by MTBE contamination is fact-specific in a variety of ways not discussed here. Nonetheless, the fact that there is a wide variation within population of the ability to detect the chemical must be considered by the jury when it determines whether plaintiffs were harmed.

III. LEGAL STANDARD FOR ADMITTING EXPERT TESTIMONY

Rule 702 of the Federal Rules of Evidence provides:

> If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.[18]

Because the crux of the defendants' argument is that Dr. Cain's testimony is not "the product of reliable principles and methods," the key issue on this motion is what constitutes a "reliable" method or principle under Rule 702.[19] In this area of

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[18] Fed. R. Evid. 702.

[19] *See, e.g.*, Def. Mem. at 1 (moving to exclude Dr. Cain's testimony because he is "[a]dmittedly using a methodology never before employed . . . .").

law, as in others, "a page of history is worth a volume of logic."[20] Accordingly, I will briefly review the history of the law that this Court must apply to the issue raised by the defendants.[21]

A. The Supreme Court's Decision in *Daubert*

In 1923, the Court of Appeals for the District of Columbia held in *Frye v. United States*[22] that testimony by an expert witness is only admissible if based on methods that were generally accepted within the appropriate scientific community.[23] *Frye*'s "general acceptance" test became the dominant test in federal courts, which followed common law rules when admitting evidence.

However, in 1975, Congress enacted the Federal Rules of Evidence.[24] Rule 402 provided the new baseline for evaluating the admissibility of evidence and stated: "All *relevant* evidence is admissible, except as otherwise provided by the Constitution of the United States, by Act of Congress, by these rules, or by

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[20] *New York Trust Co. v. Eisner*, 256 U.S. 345, 349 (1921) (Holmes, J.).

[21] *See also* Margaret A. Berger, "The Supreme Court's Trilogy on the Admissibility of Expert Testimony," Federal Judicial Center, *Reference Manual on Scientific Evidence* 9-38 (2d ed. 2000) ("Berger, Supreme Court's Trilogy").

[22] 293 F. 1013 (D.C. Cir. 1923).

[23] *Id.* at 1014.

[24] *See* Act to Establish Rules of Evidence for Certain Courts and Proceedings, Pub L. No. 93-595, 88 Stat. 1926 (1975).

other rules prescribed by the Supreme Court pursuant to statutory authority."[25] In addition, Rule 702 stated:

> If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.

In 1993, the Supreme Court held in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,[26] that the admissibility of expert testimony was governed by the Federal Rules, rather than common law evidentiary rules, and nothing in the language or history of the Rules reflected an intent to incorporate *Frye*'s "general acceptance" test.[27]

As *Daubert* explained, "under the Rules the trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant," as

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[25] *See id.* (emphasis added).

[26] 509 U.S. 579 (1993).

[27] *See id.* at 588 ("Nothing in the text of this Rule establishes 'general acceptance' as an absolute prerequisite to admissibility. Nor does respondent present any clear indication that Rule 702 or the Rules as a whole were intended to incorporate a 'general acceptance' standard."). *See also Nimely v. City of New York*, 414 F.3d 381, 395 (2d Cir. 2005) ("It is a well-accepted principle that Rule 702 embodies a liberal standard of admissibility for expert opinions, representing a departure from the previously widely followed, and more restrictive, standard of *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923)) (citing *Daubert*); *Amorgianos v. National R.R. Passenger Corp.*, 303 F.3d 256, 265 (2d Cir. 2002).

required by Rule 402, "but reliable."[28] The Supreme Court derived this test from the text of Rule 702 and the meaning of the word "knowledge."[29] "[T]he word 'knowledge' connotes more than subjective belief or unsupported speculation. The term 'applies to any body of known facts or to any body of ideas inferred from such facts or accepted as truths on good grounds.'"[30]

The Supreme Court made it clear that "reliable" was a reference to "*evidentiary* reliability–that is, trustworthiness."[31] Moreover, the Supreme Court limited its discussion "to the scientific context because that [was] the nature of the expertise offered here."[32] In particular, the Court "examined the characteristics of scientific methodology and set out a non-exclusive list of four factors that bear on whether a technique has been derived by the scientific method."[33] These non-exclusive four factors included: (1) whether the theory can be and has been tested; (2) whether the theory has been subjected to peer review; (3) any known error rate;

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28 *Daubert*, 509 U.S. at 589.

29 *See id.*

30 *Id.* (quoting *Webster's Third New International Dictionary* 1252 (1986)).

31 *Id.* at 590 n.9 (emphasis in original).

32 *Id.* at 590 n.8.

33 Berger, Supreme Court's Trilogy at 12.

and (4) general acceptance in the relevant expert community.[34]

B. The Supreme Court's Decision in *Kumho Tire*

While *Daubert* involved a doctor providing scientific testimony, case law before and after the decision provided numerous examples of non-scientific expertise that might be offered at trial. For example, a witness might be an expert in terms used by drug dealers, handwriting analysis, criminal *modus operandi*, land valuation, check marking identification, drug trafficking operations, agricultural practices, railroad procedures, organized crime jargon, commercial lending practices or attorneys' fee valuation.[35] Likewise, as one commentator wrote in the immediate aftermath of *Daubert*:

> There are numerous examples of technical but nonscientific experts whose credentials normally include substantial formal instruction in the techniques of a discipline. Attorneys, historians, and musicians fall into this category. There are also many nonscientific experts who have informally acquired specialized knowledge through practical experience. This category includes auctioneers, bankers, railroad brakemen, businesspersons, carpenters, farmers, security guards, and trapshooters. The courts have even gone to the length of permitting experienced drug users to testify as experts about the

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[34] *See Daubert*, 509 U.S. at 592-94.

[35] *See* Brief for United States as Amicus Curiae 18-19, and n.5, *Kumho Tire Co., Ltd. v. Carmichael,* 526 U.S. 137 (1999) (No. 97-1709) available at 1998 WL 541947.

identity of alleged contraband drugs.[36]

In *Kumho Tire Company v. Carmichael*, the Supreme Court held that Rule 702 imposed a basic gatekeeping obligation upon a trial judge when considering *any* expert testimony regardless of whether it involved scientific testimony.[37] The Court again focused on the language of Rule 702 and, in particular, the word "knowledge" which "establishes a standard of evidentiary reliability."[38] Moreover, "*Daubert* pointed out that Federal Rules 702 and 703 grant expert witnesses testimonial latitude unavailable to other witnesses on the 'assumption that the expert's opinion will have a *reliable* basis in the knowledge

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[36] Edward J. Imwinkelried, "The Next Step After Daubert: Developing a Similarly Epistemological Approach to Ensuring the Reliability of Nonscientific Expert Testimony," 15 *Cardozo L. Rev.* 2271, 2278-79 (1994) (numerous citations omitted). "Nonscientific expert witnesses are not only varied; they frequently appear at modern trials." *Id.* (discussing two studies that attempted to determine the types of expert witnesses called at criminal trials in the 1960s and civil trials in the 1980s).

[37] The fact that Rule 702 applied to all expert testimony was uncontroversial. *See Kumho Tire*, 526 U.S. at 147. ("The initial question before us is whether this basic gatekeeping obligation applies only to 'scientific' testimony or to all expert testimony. We, like the parties, believe that it applies to all expert testimony.").

[38] *Id.* ("In *Daubert*, the Court specified that it is the Rule's word 'knowledge,' not the words (like 'scientific') that modify that word, that 'establishes a standard of evidentiary reliability.'") (quoting *Daubert*, 509 U.S. at 589-90).

and experience of his discipline.'"[39] This standard applied to all experts regardless of the type of testimony offered.

The Supreme Court explained:

> The objective of [the gatekeeping] requirement is to ensure the reliability and relevancy of expert testimony. It 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.[40]

In determining whether the expert has satisfied this standard, *Daubert*'s four factors may, or may not, bear on the issue of the reliability of the expert's methodology. "Life and the legal cases that it generates are too complex to warrant so definitive a match."[41]

C. The 2000 Amendments to Rule 702

In 2000, the Rules were amended in response to *Daubert* and its progeny including the Supreme Court's decision in *Kumho Tire*. The following language was added to the end of the Rule: "if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and

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39 *Id.* at 148 (quoting *Daubert*, 509 U.S. at 592) (emphasis added).

40 *Id.* at 152.

41 *Id.* at 151.

methods, and (3) the witness has applied the principles and methods reliably to the facts of the case."[42] As the Advisory Committee Note to Rule 702 explained:

> The amendment affirms the trial court's role as gatekeeper and provides some general standards that the trial court must use to assess the reliability and helpfulness of proffered expert testimony. Consistent with *Kumho Tire*, the Rule as amended provides that all types of expert testimony present questions of admissibility for the trial court in deciding whether the evidence is reliable and helpful . . . .
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> Some types of expert testimony will be more objectively verifiable, and subject to the expectations of falsifiability, peer review, and publication, than others. Some types of expert testimony will not rely on anything like a scientific method, and so will have to be evaluated by reference to other standard principles attendant to the particular area of expertise.[43]

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[42] Fed. R. Evid. 702.

[43] Fed. R. Evid. 702, 2000 Advisory Committee Note.

IV. DR. CAIN'S METHODOLOGY IS NOT RELIABLE

The Court has no doubt that "scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence."[44] Nor does the Court have any doubt that Dr. Cain is "a witness qualified as an expert by knowledge, skill, experience, training, or education."[45] As his current on-line biography at the University of California, San Diego, explains:

> Dr. William S. Cain became professor of surgery (otolaryngology) at the University of California, San Diego in 1994. Dr. Cain received his B.S. from Fordham and his Ph.D. from Brown. He spent 27 years at the John B. Pierce Laboratory at Yale University where he was professor of environmental health and psychology. His research focuses on the human sense of smell and the irritation sense. He has worked on both basic and applied issues of chemosensory perception. His work has had application to indoor air quality, use of odors to warn of hazards, aging and the perception of food, and the evaluation of olfactory functioning in patients. Dr. Cain has served as head of the Association for Chemoreception Sciences and as president of the New York Academy of Sciences. He has been elected fellow in such diverse societies as the American Psychological Association, American Psychological Society, Academy of Indoor Air Sciences, and American Society of Heating, Refrigerating, and Air-Conditioning Engineers. He has served on various panels or committees for the National Institutes of Health and the National Research Council/National Academy of Sciences, most recently the Advisory Group for Strategies to Protect the Health of U.S.

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[44] Fed. R. Evid. 702.

[45] *Id.*

Forces.[46]

Thus, in determining the admissibility of Dr. Cain's testimony, the key question is whether Rule 702's three criteria are satisfied.

> According to the initial expert report submitted by Dr. Cain:
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> It is my opinion that MTBE can be detected by smell and/or taste in drinking water at levels at or below 1 part per billion (ppb). At concentrations at or below 1 ppb, MTBE can impart a distinctive taste and odor to water.[47]

Dr. Cain reached this conclusion in two steps. *First*, Dr. Cain selected one study to focus on from the dozens of reported studies on the human threshold for detecting MTBE.[48] *Second*, Dr. Cain discussed potential flaws in this study which

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[46] http://surgery.ucsd.edu/chemosensory/cain.html. *See also* Curriculum Vitae of William S. Cain, Ph.D., attached as Ex. C to Plaintiffs' Response to Defendants' Motion in Limine to Exclude the Opinion of Williams S. Cain, Ph.D. ("Pl. Mem.").

[47] Cain Report at 2.

[48] Dr. Cain provides two reasons for selecting the Stocking Study as the most accurate of the dozens of studies that have been conducted on the taste and odor threshold. *First*, "studies that find higher thresholds for a given material raise more doubts about validity than studies that find lower thresholds" and the Stocking Study found the lowest threshold of the published studies. *Id.* at 4. *Second*, "coarse methodology will yield higher thresholds than more refined methodology." *Id.* However, Dr. Cain offers no support for either of these propositions. As a result, his methodology in selecting the study may be unreliable because it relies solely on the studies' conclusions for selection and declares that the studies with lower thresholds used better methodology. Because his testimony is unreliable for other reasons, I do not address the reliability of his

had found a taste and odor threshold for MTBE of 15 ppb and then applied "correction factors" to lower the threshold for detecting MTBE.[49]

A. The Stocking Study

Over the last three decades, there have been more than thirty reported studies on the human threshold for detecting MTBE.[50] Of these many studies, Dr. Cain selected one to serve as the basis for his opinion: a 1998 consumer panel study by Andrew Stocking and others of MTBE odor detection, commissioned by the Oxygenated Fuels Association (the "Stocking Study").[51]

Fifty-seven people participated in the Stocking Study, which used a protocol based on American Society for Testing and Materials ("ASTM") method E679-91.[52] The ASTM Method is "a standard and well-accepted methodology" that can "be rigorously duplicated by other researchers."[53] The study only focused

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selection in this opinion.

[49] *See id.* at 4-6.

[50] *See* Def. Mem. at 5.

[51] The engineers who conducted the Stocking Study describe its protocol and results in detail in *Implications of an MTBE Odor Study in Setting Drinking Water Standards* by Andrew J. Stocking *et al.*, 93 J. Am. Water Works Ass'n 95 (March 2001), Ex. F. to Def. Mem.

[52] *See id.* at 101.

[53] *Id.*

on odor. As the authors explained:

> It was decided to conduct an odor study in lieu of a taste (flavor) study for two reasons: (1) it was thought an odor study would result in a lower threshold (Young et al, 1996) and (2) there would be no laboratories that would accept the liability of performing a taste (flavor) study without a primary MCL [Maximum Contaminant Level] established by CDHS [California Department of Health Services].[54]

The protocol used for this study involved presenting eight samples to the participants in increasing order: 2, 3.5, 6, 10, 18, 30, 60, and 100 ppb.[55] "The authors agreed that eight trials were the maximum number of trials to which a [participant] could be exposed before olfactory fatigue began to affect results."[56]

Under the ASTM method used by the study, the participant picked one of three samples as being different from the other samples.[57] Sample solutions of 4 oz each were presented in disposable 7-oz odor-free plastic cups.[58]

> Each spiked and blank sample was covered with a clean watch glass. The panelists were instructed to lift each sample . . . . The panelists were allowed to repeat a trial if they were uncertain after

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[54] *Id.* (citing W.F. Young *et al.*, *Taste and odor threshold concentrations of possible water contaminants*, 30 Water Res., 331-40 (1996)).

[55] *See id.* at 96, 101.

[56] *Id.* at 101 (citation omitted).

[57] *See id.*

[58] *See id.*

> the first time. Once a trial was completed, the panelist replaced the watch glasses and signaled to the consumer testing laboratory staff that he or she was finished. The panelist then indicated on his or her individual scorecard the number of the sample that smelled different from the other two. If the panelist was not able to determine a difference, he or she was directed to guess which sample smelled different.[59]

Once the data was collected, it was analyzed under ASTM method E679-91, according to which:

> individual threshold calculations are calculated by taking the geometric mean of the last concentration missed and the first concentration detected, given that all higher concentrations were successfully detected. If a panelist could detect all the concentrations presented, the threshold concentration for that panelist was the geometric mean of 2 μg/L and the next lowest theoretical concentration (1 μg/L). If a panelist did not detect the highest concentration (100 μg/L), it was assumed that the panelist would have detected the next highest theoretical concentration and the threshold was calculated to be 132 μg/L (the geometric mean of 100 and 175 μg/L).[60]

"Individual calculated thresholds ranged from 1.4 to 132 μg/L [ppb]."[61] Indeed, ten of the fifty-seven participants, or approximately eighteen percent, correctly

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[59] *See id.*

[60] *Id.* at 102-03. It should be noted that μg/L and ppb are interchangeable units of measurement.

[61] *Id.* at 103.

picked the sample that had MTBE at 2 μg/L.[62] At the same time, thirteen of the participants failed to select the sample containing MTBE at 100 μg/L.

"The test panel geometric mean threshold was calculated to be 15 μg/L, and it represents the threshold of approximately 50%" of the participants.[63] In comparison to other studies,

> [t]he geometric means from literature for MTBE in drinking water are as follows:
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> - from 13.5 to 45.5 μg/L (Shen et al, 1998) for odor,
> - 34 μg/L (Young et al, 1996) for odor, and
> - 48 μg/L (Young et al, 1996) for taste.[64]

Thus, the authors concluded, the detection threshold found in their study was generally lower than that found in other studies.[65]

B. Dr. Cain's Proposed Testimony

In sharp contrast to the Stocking Study, which provided clear definitions and results, Dr. Cain's testimony is ambiguous, confusing and

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[62] Whether all of these individuals "detected" MTBE at 2 ppb is unclear given that they were instructed to guess if they were not able to determine a difference between the samples and thus some of the participants may have guessed correctly even though they could not detect a difference.

[63] *Id.*

[64] *Id.* at 104.

[65] *See id.*

inconsistent. In his original report, Dr. Cain concludes that "MTBE *can be detected* by smell and/or taste in drinking water at levels at or below 1 part per billion (ppb)."[66] His use of the passive voice (*i.e.*, "can be detected") leaves unanswered what percentage of the population can detect MTBE at 1 ppb. A review of Dr. Cain's reports and his deposition shows that he fails to provide a clear answer to this question.

After reading Dr. Cain's initial report, it is reasonable to conclude that he is arguing the "threshold" for the population as a whole is 1 ppb, which would imply that more than fifty percent of the population could detect MTBE at this level.[67] Yet, in his Well Specific Report, Dr. Cain puts forward at least six different positions regarding the percentage of the population that can detect MTBE at this level:

- "Had the investigators continued the testing with more trials, I opined [in the previous report], they would have found a lower threshold. With thorough testing, they would likely have found the threshold to lie at 3 ppb instead of the 15 ppb they reported . . . . If the threshold had equaled 3 ppb, then as many as one-third of their subjects would have detected 1 ppb or below."[68]

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66 Cain Report at 2 (emphasis added).

67 *See id.* at 4.

68 Well Specific Rpt. at 1.

- "Depending on how one extrapolates the bottom of the curves from Stocking et al., one might conclude that 18% of subjects could detect 0.5 ppb, or a somewhat lower percentage could, perhaps 10%."[69]

- "When I have opined that MTBE can be detected by a substantial fraction of subjects at 1 ppb or below, I have always defined it as 10% . . . ."[70]

- "When approximately half of the samples in a well exceed 0.25 ppb MTBE, as many as half the people who smell the water might find it different from normal."[71]

- "A sample taken on February 23, 2004, reached 0.5 ppb . . . . It is, therefore, my conclusion that MTBE could have been detected by some fraction of the population and any taste or odor would have been attributable only to the presence of MTBE."[72]

- "[T]here is credible scientific support for the ability of some people to detect MTBE at levels as low as 0.04 ppb. Using this figure as a guideline, at least some consumers could have detected MTBE even at levels below 0.5 ppb."[73]

In his rebuttal report, Dr. Cain states, *inter alia*:

> If we use the factor of two to correct for the effect of age, we

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69 *Id.* at 5.

70 *Id.*

71 *Id.*

72 *Id.* at 7.

73 *Id.* at 9.

> would reduce our estimated threshold from 3 ppb to essentially 1.5 ppb. We would expect about 50% of young adults, up to about 35 years of age, to have thresholds lower than that.[74]

Finally, during his deposition, Dr. Cain stated that fifty percent of the population would detect MTBE at levels ranging from 0.5 to 1 ppb.[75] In particular, Dr. Cain testified:

> Q. Okay. Let's assume that you've got that kind of detection activity going on for the year 2002. My question is whether you can approximate, to a reasonable degree of scientific certainty, what percentage of [the] customers would have been able to detect the odor of MTBE in that well water?
>
> A. I would say something – probably something above 50 percent of the people.
>
> Q. Okay.
>
> A. Okay.
>
> Q. And can you tell me how that was derived?
>
> A. Well, if I–if I say a significant fraction of .5, I mean – I've said I don't know the exact threshold for MTBE, but I believe it to be in the vicinity of .5 to 1. And these data cover that span.[76]

Dr. Cain's failure to present a consistent opinion about the percentage

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[74] Cain Rebuttal at 8.

[75] *See* 8/29/07 Transcript of Deposition of William S. Cain ("Cain Dep.") at 506.

[76] *Id.*

of the population he believes can detect MTBE at 1 ppb, or any other level, severely detracts from his reliability. Indeed, the only consistency in Dr. Cain's testimony is that every well discussed in his reports has been contaminated to such an extent that plaintiffs were harmed – no matter what that level of contamination is. As a result, it appears Dr. Cain is reaching his conclusion first (*i.e.*, MTBE in the well is detectable) and then providing whatever reasons are necessary to support it.

This observation is not surprising given that Dr. Cain does not base his conclusions on any study he conducted or any identifiable methodology. He provides no support for his opinions, other than that discussed below.

C. Dr. Cain's Methodology for Correcting Errors in the Stocking Study Is Unreliable

The Stocking Study found a general population threshold of 15 ppb for the detection of MTBE. In contrast, Dr. Cain has opined that MTBE can be detected at 1 ppb. Putting to one side the problems identified above, Dr. Cain has nonetheless failed to use a reliable methodology in reaching this conclusion.

Dr. Cain arrived at his conclusion by identifying three major flaws in the methodology of the Stocking Study and then applying "corrective factors."[77]

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[77] Cain Report at 4.

The first problem according to Dr. Cain is that the Stocking Study did not test the threshold at which people can *taste* MTBE:

> The study dealt with the odor sniffed from solutions and not from solutions taken into the mouth, as would a study of flavor. Stocking, Suffet, McGuire, & Kavanaugh noted, "there were no laboratories available that would accept the liability of performing a taste (flavor) study without a primary MCL (Maximum Contaminant Level) established by CDHS (California Department of Health Services)" (p. 91). Their statement implies that they considered a flavor study of value, as indeed they should have. It is well known that the two modes of presentation of the solutions have an unpredictable relationship. Even if we accepted the validity of the Stocking, Suffet, McGuire, & Kavanaugh study, we would know only half the story, so to speak.[78]

However, Dr. Cain does not address the fact that the authors of the Stocking Study stated that an odor study would result in a *lower* threshold than a taste study and cited supporting research for this conclusion.[79] Instead, Dr. Cain simply states "the two modes of presentation of the solutions have an unpredictable relationship."[80]

The second problem that Dr. Cain points out is that "participants [in

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[78] *Id.*

[79] *See Implications of an MTBE Odor Study in Setting Drinking Water Standards* by Andrew J. Stocking *et al.*, 93 J. Am. Water Works Ass'n 95, 101 (March 2001) (citing W.F. Young *et al.*, *Taste and odor threshold concentrations of possible water contaminants*, 30 Water Res., 331-40 (1996)).

[80] Cain Report at 4.

the Stocking Study] only got one opportunity to sniff each concentration" because it used the "ASTM method."[81] In a study testing detection thresholds of glutaraldehyde, "a colorless, oily, liquid-chemical with a pungent odor,"[82] Dr. Cain compared the ASTM method with another method involving several rounds of testing for each concentration:

> In a test of the flavor of glutaraldehyde in drinking water, we compared the threshold that the ASTM method would have yielded, *i.e.*, stopping after one sweep through the test concentrations, with that from more extensive testing of the same genre (Cain & Schmidt, 2002). Our threshold lay almost a factor of five below the ASTM threshold. That is, participants evinced more sensitivity with more testing, hardly surprising.[83]

In other words, in one study by Dr. Cain, as participants were given repeated tastes of glutaraldehyde in water, they were able to detect it at lower thresholds at "almost a factor of five."[84]

There are a number of problems with dividing the results of the Stocking Study by five to determine the "true" threshold for detecting MTBE but

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81 *Id.*

82 National Institute for Occupational Safety and Health, *Glutaraldehyde* (September 2006) available at http://www.cdc.gov/niosh/topics/glutaraldehyde. Glutaraldehyde has a number of applications including the sterilization of medical and dental equipment. *See id.*

83 Cain Report at 4-5.

84 *Id.*

the most fundamental one is that it lacks scientific rigor. To begin, transferring the results from a study of one substance to another has no validity. In addition, the glutaraldehyde study tested taste, not odor, detection. Most importantly, Dr. Cain cannot name another scientist who has ever employed, much less approved of, such a method (*i.e.*, dividing the results of one study by five because another study on an unrelated chemical showed that the subjects' threshold decreased by "almost a factor of five" with repeated testing). Nor has Dr. Cain attempted to report this method in any peer-reviewed journal or "in some public way" so that other scientists could offer criticisms or suggestions.[85] Indeed, Dr. Cain has never used it in his day-to-day work, or applied it to any study other than the Stocking Study, which only occurred after he was hired by the plaintiffs as their expert.[86]

Likewise, in his report, Dr. Cain has not addressed whether this correction factor is constant regardless of the type of chemical being tested. For example, in his deposition, Dr. Cain pointed to one study by Pam Dalton at Monell Chemical Senses Center, which showed a 50,000 to 1 change in the results shown by female panelists when repeated tests were given to the participants.[87] At the

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85 *See* Cain Dep. at 128-29, 132.

86 *See id.* at 132-35, 216-218.

87 *See id.* at 197-200.

same time, Dr. Cain explains: "I think it was just happenstance that they got it for this one chemical because they haven't found it for every chemical, but it's an unbelievable phenomenon if true."[88]

At most, Dr. Cain is offering an insightful hunch about what would happen had the Stocking Study been designed differently based on his research on a chemical that is unrelated to MTBE. Yet it is well established that an "insightful, even an inspired, hunch" must be excluded if it "lacks scientific rigor."[89] Of course, this may well "prevent the jury from learning of authentic insights and innovations. That, nevertheless, is the balance that is struck by Rules of Evidence designed not for the exhaustive search for cosmic understanding but for the particularized resolution of legal disputes."[90]

Of course, even if the Stocking Study's result of 15 ppb is divided by five that only yields 3 ppb. To reach 1 ppb, Dr. Cain applied a second "correction factor" based on his identification of a third problem with the Stocking Study: it included older participants who presumably had lost some of their ability to detect

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88 *Id.* at 197.

89 *Rosen v. Ciba-Geigy Corp.*, 78 F.3d 316, 319 (7th Cir. 1996).

90 *Daubert*, 509 U.S. at 597.

odor and taste as they aged.[91] Dr. Cain explains:

> Many studies have shown that olfaction and taste deteriorate with age (e.g., Stevens & Cain, 1993). The process begins in middle age and accelerates. To include older participants in a threshold study invites an elevated answer, but just as important increases the variability of distribution and can blur the answer. I cannot assess specifically how to "correct" for the inclusion of this systematically less sensitive fraction of the population.[92]

Despite being unable to "assess specifically how to 'correct'" for this perceived flaw in his original report, Dr. Cain later explained that he selected a factor of two.[93] Once again, Dr. Cain offers no reliable methodology for his conclusion that a factor of two is appropriate to "correct" for the Stocking Study's use of older participants.

Finally, Dr. Cain finds support for his conclusion by briefly relying on another study from 1993. Dr. Cain explains:

> Despite the claim by Stocking, Suffet, McGuire, & Kavanaugh that 15 μg/L (15 ppb) represents the only scientifically supportable value, another study sponsored by the industry (ARCO Chemicals, UK) presented credible data that: "The concentration at which 70% of an experienced panel can detect

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91 *See* Cain Report at 5-6.

92 *Id.*

93 *See* Cain Dep. at 215-16 ("Q: But have you provided a multiplication or division factor in your interpretation equation on account of the use of older people? A: Yeah, I think I put it in one report, and I estimate it as a factor of 2 . . . . That was the best I could come up with.").

> the flavour of MTBE in water is between 0.04 and 0.06 ppb" (p. 4) (Campden Food and Drink Research Association, 1993). These values lie twenty times lower than 1 ppb. Tests of odor perception yielded 70% detection for aqueous concentrations below one-half a ppb. The testing, though described somewhat sparsely, seems no less credible than that used in the Stocking et al. study. Since the Stocking et al. study did not include concentrations at or below 1 ppb, it could hardly have obtained the values of that study.[94]

The citation to this unpublished study does support Dr. Cain's conclusion but it does nothing to validate the *methodology* by which he reached his conclusion. While plaintiffs might offer this 1993 study to the jury, subject to a ruling on any objections that the defendants might raise, it cannot overcome the fact that Dr. Cain has not relied on a scientific method to reach his conclusion.[95]

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[94] *Id.* at 6.

[95] Because this motion only involves the admissibility of Dr. Cain's testimony, I do not address whether the 1993 study would be admissible at trial. However, defendants have raised potential problems with the study. *First*, it was unpublished and not subjected to any peer review. *See* Def. Mem. at 10. *Second*, the Camden Laboratory has twice attempted to replicate the results of the experiment yet been unable to do so. *See id.* (citing Campden & Chorleywood Food Research Ass'n Group, *Flavour and Odour Thresholds of Methyl Tertiary Butyl Ether (MTBE) in Water*, Report No. S/REP/74638 (Jan. 5, 2004), attached as Exhibit J to Def. Mem). The difference between the studies may exist because the latter two studies confirmed the MTBE concentrations in the samples using gas chromatography. *See id.* "Dilution errors as substantial as 100-fold may have occurred in preparation of samples in Campden (1993), since no analytical work was apparently ever done to verify the actual concentrations of the dilutions." *Id.* (citing I.H. Suffet, "A Re-Evaluation of the Taste and Odour of Methyl Tertiary Butyl Ether (MTBE) in Drinking Water," 55 *Water Science & Tech.* 265, 270 (2007)).

D. Dr. Cain's Testimony Fails to Use the Same Level of Intellectual Rigor that Would be Used by a Scientist in His Field

In the end, Dr. Cain's testimony does not satisfy Rule 702 because he has failed to demonstrate that he is employing "the same level of intellectual rigor that characterizes the practice of an expert in the relevant field."[96] Dr. Cain proposes to offer scientific testimony about the level at which people can detect MTBE in their water. In the context of evaluating scientific evidence, *Daubert* offered four factors to help guide courts in evaluating the admissibility of scientific testimony, none of which Dr. Cain has satisfied. His conclusion and methodology have (1) not been tested, (2) have not been subjected to peer review and publication, (3) have not identified a known or potential rate of error, and (4) have not gained general acceptance in the relevant community.[97] Moreover, given the problems identified above, I am not convinced that Dr. Cain "'[has been] as careful as he would be in his regular professional work outside his paid litigation consulting.'"[98]

Plaintiffs attempt to avoid Dr. Cain's failure to satisfy any of the

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96 *Kumho Tire*, 526 U.S. at 152.

97 *See Daubert*, 509 U.S. at 593-94.

98 Fed. R. Evid. 702, 2000 Advisory Committee Note (quoting *Sheehan v. Daily Racing Form, Inc.*, 104 F.3d 940, 942 (7th Cir. 1997)).

Daubert criteria or otherwise demonstrate the scientific validity of his method by arguing that his "methodology" really involves "his application of education, observation, and 40 years of experience."[99] Of course, plaintiffs are correct that experts may apply their education, observation and experience in certain contexts and still be found to use a reliable method even without satisfying *Daubert*'s factors.

For example, it might be pointless to ask whether railroad brakemen, carpenters, or experienced drug users have subjected their opinions to peer review and publication or the known rate of error in scientific studies. Yet, courts should still allow such experts to testify so long as they use a reliable method (*i.e.*, trustworthy) and otherwise satisfy Rule 702's requirements. There is no one formula for distinguishing reliable and unreliable methods for all experts for the simple reason that there are too many fields in which people may have expertise. This is why the Supreme Court explained that the final question to answer is whether the expert "employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field."[100]

However, when an expert is offering testimony that is presented as a

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[99] Pl. Mem. at 1.

[100] *Kumho*, 526 U.S. at 152.

scientific conclusion and the expert's method fails to satisfy *any* of the factors identified in *Daubert*, a court should pause and take a hard look before allowing a jury to consider it. Courts are not naive about the fact that some attorneys will incorrectly instruct experts that their "first and most important role is to be an advocate for the party who calls him as a witness."[101] An expert's first and most important duty is to testify truthfully and accurately to the best of his ability and leave the advocacy to the lawyers. But because some experts are misled by their attorneys, or even just mistaken, about their role in litigation, courts must continue to act as a gatekeeper in determining whether to admit the testimony.

In this case, plaintiffs want Dr. Cain to present scientific testimony about the threshold at which people can detect MTBE. As the Supreme Court emphasized in *Daubert*: "In a case involving scientific evidence, *evidentiary reliability* will be based upon *scientific validity*."[102] Dr. Cain's testimony is not based on a method that has *scientific* validity. Indeed, the Court would be surprised if Dr. Cain were to submit such a report to his colleagues for discussion or review, or if he were to use it as a model for his students to follow when

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[101] Robert J. Shaughnessy, *Dirty Little Secrets of Expert Testimony*, 33 A.B.A. Litigation No. 2, p. 47 (Winter 2007).

[102] *Daubert*, 509 U.S. at 590 n.9 (emphasis in original).

explaining research and studies in his field.[103] As a result, Dr. Cain's proffered opinion that MTBE can be detected by smell or taste in drinking water at levels at or below 1 ppb must be excluded.

V. CONCLUSION

For the reasons above, defendants' motion *in limine* is granted. The Clerk of the Court is directed to close this motion (docket # 1532).

SO ORDERED:

Dated: New York, New York
May 7, 2008

Shira A. Scheindlin
U.S.D.J.

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[103] *See, e.g.*, Stephen Breyer, "Introduction," in *Reference Manual on Scientific Evidence* 1, 4 (2d ed. 2000) (explaining the appropriate role of a judge's gatekeeping function by giving the example of a physicist who was asked if a certain scientific paper was wrong and replied, "That paper isn't even good enough to be wrong!"); Bert Black, "Focus on Science, Not Checklists," 39 Trial 24, 32 (Dec. 2003) ("If a plaintiff expert were in a room with other scientists in the field at issue, would they take seriously the explanation of how his or her conclusions were reached? Or would they consider the testimony so far removed from science as not to merit discussion? Only the latter should lead to exclusion of the testimony.").

-Appearances-

Liaison Counsel for Plaintiffs:

Robin Greenwald, Esq.
Robert Gordon, Esq.
Weitz & Luxenberg, P.C.
180 Maiden Lane
New York, New York 10038
Tel: (212) 558-5500
Fax: (212) 344-5461

Liaison Counsel for Defendants:

Peter John Sacripanti, Esq.
James A. Pardo, Esq.
McDermott Will & Emery LLP
50 Rockefeller Plaza, 11th Floor
New York, New York 10020
Tel: (212) 547-5583
Fax: (212) 547-5444

Counsel for Defendants Lyondell Chemical Company and Equistar Chemicals, LP:

Alan J. Hoffman, Esq.
Jeffrey S. Moller, Esq.
Blank Rome LLP
The Chrysler Building
405 Lexington Avenue
New York, NY 10174
Tel: (212) 885-5000
Fax: (917) 332-3847