UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF LOUISIANA

YOLANDE BURST, individually and as the legal representative of BERNARD ERNEST BURST, JR.	CIVIL ACTION
VERSUS	NO: 14-109
SHELL OIL COMPANY, ET AL.	SECTION: R

ORDER AND REASONS

Defendants Shell Oil Company, Chevron U.S.A. Inc., and Texaco, Inc. move to exclude plaintiff's expert, Richard Miller.[1] Because the Court finds that Miller's methodology for calculating Mr. Burst's benzene exposure is unreliable, the Court GRANTS defendants' motion and excludes the testimony of Miller.

I. BACKGROUND

Plaintiff Yolande Burst filed this products liability action against defendants Shell, Chevron (as successor to Gulf Oil Corporation), and Texaco.[2] She alleges that her late husband, Bernard Burst, Jr., worked at various Shell Oil, Gulf Oil, and Texaco gas stations from 1958 through 1971, during which time he regularly used products manufactured, supplied, distributed, and

[1] R. Doc. 87.

[2] R. Doc. 1.

sold by defendants.[3] Specifically, she alleges that he would regularly come into contact with gasoline containing benzene.

On June 20, 2013, physicians diagnosed Mr. Burst with acute myeloid leukemia (AML).[4] He was 71 years old. He passed away as a result of the leukemia on December 21, 2013.[5]

Plaintiff alleges that her husband's regular exposure to gasoline containing benzene during the years he worked as a gas station attendant and mechanic caused his leukemia.[6] She claims that defendants negligently manufactured and sold products containing benzene and that they negligently failed to warn foreseeable users about the health hazards associated with these products.[7] She also alleges strict products liability.[8]

As evidence of Mr. Burst's exposure to benzene through his use of defendants' products, plaintiff relies on an expert report from Richard Miller, an industrial hygienist. In the report, Miller provides an estimate of Mr. Burst's cumulative exposure to benzene from gasoline while working at a Gulf Oil gas station over a one-year period between 1966 and 1968. Defendants now move to exclude

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[3] *Id.* at 3.

[4] R. Doc. 28-5 at 18.

[5] R. Doc. 28-6.

[6] R. Doc. 1 at 5.

[7] *Id.* at 9.

[8] *Id.* at 10.

Miller's opinions on the ground that they are unreliable and irrelevant.

II. LEGAL STANDARD

A district court has considerable discretion to admit or exclude expert testimony under Federal Rule of Evidence 702. *See General Elec. Co. v. Joiner*, 522 U.S. 136, 138-39 (1997); *Seatrax, Inc. v. Sonbeck Int'l, Inc.*, 200 F.3d 358, 371 (5th Cir. 2000). Federal Rule of Evidence 702, which governs the admissibility of expert witness testimony, provides:

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

Fed. R. Evid. 702.

In *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, the Supreme Court held that Rule 702 requires the district court to act as a gatekeeper to ensure that "any and all scientific testimony or evidence admitted is not only relevant, but reliable." 509 U.S. at 589; *see also Kumho Tire Co., Ltd. v. Carmichael,* 526 U.S. 137, 147 (1999) (clarifying that the *Daubert* gatekeeping function applies to all forms of expert testimony). The Court's gatekeeping function

thus involves a two-part inquiry into reliability and relevance.

First, the Court must determine whether the proffered expert testimony is reliable. The party offering the testimony bears the burden of establishing its reliability by a preponderance of the evidence. *See Moore v. Ashland Chem. Inc.,* 151 F.3d 269, 276 (5th Cir. 1998). The reliability inquiry requires the Court to assess whether the reasoning or methodology underlying the expert's testimony is valid. *See Daubert,* 509 U.S. at 592-93. The aim is to exclude expert testimony based merely on subjective belief or unsupported speculation. *See id.* at 590. The Court in *Daubert* articulated a flexible, non-exhaustive, five-factor test to assess the reliability of an expert's methodology. These factors include: (1) whether the expert's theory can be or has been tested; (2) whether the theory has been subject to peer review and publication; (3) the known or potential rate of error of a technique or theory when applied; (4) the existence and maintenance of standards and controls; and (5) the degree to which the technique or theory has been generally accepted in the scientific community. *Id.* at 593-95. The Supreme Court has emphasized, however, that these factors "do not constitute a 'definitive checklist or test.'" *Kumho*, 526 U.S. at 150 (quoting *Daubert*, 509 U.S. at 593). Rather, district courts "must have considerable leeway in deciding in a particular case how to go about determining whether particular expert testimony is reliable." *Id.* at 152. Courts have also considered

whether experts are "proposing to testify about matters growing naturally and directly out of research they have conducted independent of the litigation, or whether they have developed their opinions expressly for purposes of testifying," *Daubert v. Merrell Down Pharms., Inc.*, 43 F.3d 1311, 1317 (9th Cir. 1995), whether the expert has adequately accounted for obvious alternative explanations, *see Claar v. Burlington N.R.R.*, 29 F.3d 499 (9th Cir. 1994), and whether the expert "is being as careful as he would be in his regular professional work outside his paid litigation consulting," *Sheehan v. Daily Racing Form, Inc.*, 104 F.3d 940, 942 (7th Cir. 1997).

A district court's gatekeeper function does not replace the traditional adversary system or the role of the jury within this system. *See Daubert*, 509 U.S. at 596. As the Supreme Court noted in *Daubert*: "Vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence." *Id.* The Fifth Circuit has held that, in determining the admissibility of expert testimony, district courts must accord proper deference to "the jury's role as the proper arbiter of disputes between conflicting opinions. As a general rule, questions relating to the bases and sources of an expert's opinion affect the weight to be assigned that opinion rather than its admissibility and should be left for the jury's consideration."

United States v. 14.38 Acres of Land, More or Less Situated in Leflore Cnty., Miss., 80 F.3d 1074, 1077 (5th Cir. 1996) (quoting *Viterbo v. Dow Chem. Co.*, 826 F.2d 420, 422 (5th Cir. 1987)) (internal quotation marks omitted). Nonetheless, expert testimony "must be reliable at each and every step or else it is inadmissible. The reliability analysis applies to all aspects of an expert's testimony: the methodology, the facts underlying the expert's opinion, the link between the facts and the conclusion, et alia." *Knight v. Kirby Inland Marine Inc.*, 482 F.3d 347, 355 (5th Cir. 2007) (internal quotation marks omitted). "Where the expert's opinion is based on insufficient information, the analysis is unreliable." *Paz v. Brush Engineered Materials, Inc.*, 555 F.3d 383, 388 (5th Cir. 2009).

In *Joiner*, the Supreme Court explained that "nothing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert." 522 U.S. at 146. Rather, "[a] court may conclude that there is simply too great an analytical gap between the data and the opinion proffered." *Id.*; *see also LeBlanc v. Chevron USA, Inc.*, 396 F. App'x 94, 98 (5th Cir. 2010).

Second, the Court must determine whether the expert's reasoning or methodology is relevant. The question here is whether the reasoning or methodology "fits" the facts of the case and will thereby assist the trier of fact to understand the evidence. *See*

Daubert, 509 U.S. at 591.

III. DISCUSSION

Richard Miller is an industrial hygienist retained by plaintiff. Miller attempts to reconstruct Mr. Burst's work duties during a one-year period during which Mr. Burst worked at a Gulf Oil gas station between 1966 and 1968, almost 50 years ago, and then to estimate, based on various models, Mr. Burst's exposure to benzene as a component of gasoline. Notably, because Mr. Burst passed away before the filing of this case, Miller's reconstruction relies on the testimony of other witnesses. Yolande Burst, Mr. Burst's wife, Frank Simpson, a co-worker at the Gulf Oil gas station, and Charles Bernard, the former owner of the Gulf Oil gas station, provided testimony on which Miller relies in establishing Mr. Burst's work hours, work duties, and, ultimately, his exposure to benzene as a component of gasoline.

The witness testimony indicates that Mr. Burst refueled cars and worked as a mechanic at a Gulf Oil gas station. Both Mr. Simpson and Mr. Bernard testified that, during refueling, gasoline spills exposed attendants to gasoline. Mr. Bernard stated that attendants could even be "bathed" in gasoline as a result of spills. Ms. Burst, Mr. Simpson, and Mr. Bernard also testified that Mr. Burst, as part of his mechanic duties, frequently washed his hands and parts in a bucket of gasoline located inside the

station's garage. This caused Mr. Burst's hands to become wet with gasoline. On occasions when Ms. Burst observed Mr. Burst washing his hands and parts inside the garage, she testified that the fumes caused her to become lightheaded within 15 minutes. According to Ms. Burst, the garage smelled strongly of gasoline in the winter months when the garage's bay doors remained closed. Ms. Burst also testified that Mr. Burst smelled strongly of gasoline when he returned home from work.

Relying on the witness testimony, Miller calculated Mr. Burst's exposure to benzene from gasoline from four separate sources. First, Miller calculated Mr. Burst's cumulative one-year exposure to benzene from inhaling vapors that evaporated from the parts-washing bucket during the winter months when the garage's bay doors remained closed. Second, Miller calculated Mr. Burst's cumulative one-year dermal exposure to benzene from washing parts in gasoline. Third, Miller calculated Mr. Burst's cumulative one-year dermal exposure to benzene resulting from gasoline that soaked parts of Mr. Burst's clothing. Finally, Miller calculated Mr. Burst's cumulative one-year exposure to benzene from inhaling vapors while washing parts in gasoline.

Miller calculates that Mr. Burst was exposed to 5.499 ppm-years[9] benzene through inhaling gasoline vapors that evaporated

[9] "Expressing dose in ppm-years is easily understood. If a person was exposed to 1 ppm of a compound every year for 20 years, his or her total exposure to the compound would be 20

from the parts-washing bucket during the winter months, 37.367 ppm-years benzene through dermal exposure while washing parts in gasoline, 14.723 ppm-years benzene through dermal exposure from gasoline on clothing, and 4.089 ppm-years benzene through inhaling gasoline vapors while washing parts in gasoline.[10] In total, Miller calculates that Mr. Burst was exposed to a cumulative dose of 61.678 ppm-years benzene while working for a single year at the Gulf Oil gas station.[11]

Defendants now attack both Miller's inhalation and dermal exposure assessments. Defendants contend that Miller's estimate for background inhalation exposure from the parts-washing bucket is unreliable because the gasoline vapor levels required to expose a person to that much benzene would be so high that it would be lethal within a matter of minutes. Defendants also contend that Miller's estimate for inhalation exposure during parts washing is unreliable because Miller, in reaching his conclusion, ignored relevant data from over 14 peer-reviewed publications and relied solely on the self-reported symptoms of Ms. Burst. As to Miller's estimate of Mr. Burst's dermal exposure from parts washing, defendants contend that the estimate is unreliable because Miller

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ppm-years." *Baker v. Chevron USA, Inc.*, 680 F. Supp. 2d 865, 870 n.3 (S.D. Ohio 2010).

[10] R. Doc. 87, Ex. A at 37.

[11] *Id.*

failed to account for the evaporation of gasoline from Mr. Burst's hands, and because he did not consider the acute damage to Mr. Burst's hands that would have likely occurred had his hands been wet with gasoline for a substantial part of the day. Defendants also point out that Miller has never performed a dermal exposure assessment outside the context of litigation.

A. Miller's Estimate of Mr. Burst's Benzene Exposure from Inhaling Gasoline Evaporated from the Parts-Washing Bucket

Miller's estimate of Mr. Burst's benzene exposure from inhaling gasoline evaporated from the parts-washing bucket is unreliable because he failed to validate his results against studies, including at least one cited in his own report, showing that the corresponding gasoline vapor levels required to expose a person to that much benzene would be so high as to be lethal within a matter of minutes.

The record includes conflicting testimony as to the size and amount of gasoline contained in the parts-washing bucket. Frank Simpson testified that he and Mr. Burst used a two-gallon bucket, about halfway full of gasoline, to clean various parts.[12] According to Simpson, they kept the bucket on a bench inside of the station's garage[13] and needed to refill the bucket two or three times per

[12] R. Doc. 105, Ex. 4 at 35.

[13] R. Doc. 87, Ex. A at 23.

day.[14] There was also testimony from Simpson that the bucket was 30% full with gasoline.[15] Mr. Bernard testified that they used a pail with the diameter of a five-gallon bucket that was six inches high with three or four inches of liquid in it.[16] Ms. Burst testified that the bucket was either two or five gallons and was filled halfway with gas.[17] Based on this testimony, Miller sought to estimate how much benzene would have evaporated from the bucket into the surrounding air, and how much benzene Mr. Burst would have inhaled. Because Ms. Burst testified that the garage's bay doors were closed only in the winter months,[18] Miller chose to perform this calculation only for those months in which the garage was closed. Also, because Miller separately calculated Mr. Burst's dermal and inhalation exposure while washing parts in the parts-washing bucket, Miller limited this calculation to instances when Mr. Burst remained two feet or more away from the bucket and was not cleaning parts.

Citing monthly average high and low temperatures in New Orleans, Louisiana, Miller assumed that the bay doors remained

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[14] *Id.* at 21.

[15] R. Doc. 105, Ex. 4 at 35.

[16] R. Doc. 87, Ex. A at 20.

[17] R. Doc. 105, Ex. 15 at 2.

[18] R. Doc. 87, Ex. A at 24.

closed throughout December and January.[19] From this, and based on the assumption that Mr. Burst worked 10.5 hours per day, Miller calculated that there were approximately 1123.50 work hours in which the bay doors were closed due to cooler weather over a two-year period.[20] Assuming that Mr. Burst spent 40% of those hours in the garage, Miller calculated that Mr. Burst would have been inside the closed garage for 449.4 hours over a two-year period.

Assuming that the bucket contained one gallon of gasoline during the workday, and that the gasoline contained 1% benzene, Miller calculated that evaporation of all benzene available for evaporation into the closed bay of the garage produced a concentration of 50.9 ppm benzene.[21] Assuming Mr. Burst was exposed to this concentration of benzene for 449.4 hours over a two-year period or 224.7 hours over a one-year period, Miller estimated a cumulative benzene inhalation exposure of 10.997 ppm-years over two years or 5.499 ppm-years over one year.[22]

Defendants contend that Miller's estimate is unreliable because it is based on Miller's calculation that the garage contained 50.9 ppm benzene, which could have been possible only

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[19] *Id.*

[20] *Id.*

[21] R. Doc. 87, Ex. A at 25.

[22] Plaintiff has since withdrawn this estimate. *See* R. Doc. 105 at 4.

with lethal levels of gasoline vapor. Defendants cite Miller's own report, in which he refers to a study showing that the total gasoline vapor level for gasoline containing 1% benzene is 166.67 times greater than the benzene vapor level. Using this ratio, defendants calculate that a concentration of 50.9 ppm benzene would require a gasoline concentration of 8449 ppm. At his deposition, Miller described defendants' calculation as "absolutely fair."[23] Defendants next point to a study, again cited by Miller in his own report, showing that exposure to as little as 5000 ppm gasoline for six minutes is lethal. Yet, Miller's calculation assumes that Mr. Burst was exposed to a concentration of 8449 ppm gasoline for hundreds of hours over the course of a year. There is no evidence that Mr. Burst or any of his co-workers suffered from acute overexposure to gasoline. When confronted with these facts at his deposition, Miller conceded that his calculation "was a mistake," and that such high levels of gasoline vapor would have been "immediately dangerous to life and health."[24] Plaintiff has withdrawn this calculation and states that Miller will not include it in his cumulative estimate at trial.[25]

Even though Miller has now withdrawn his calculation, that he chose this methodology and included the findings in his report

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[23] R. Doc. 87, Ex. B at 108.

[24] *Id.* at 111.

[25] *Id.*

remains relevant because it informs the Court about Miller's overall approach to choosing and analyzing data. *See Knight*, 482 F.3d at 355 (The expert's report "must be reliable at each and every step or else it is inadmissible."); *see also Castellow v. Chevron USA*, 97 F. Supp. 2d 780, 788, 791 (S.D. Tex. 2000) (excluding expert's exposure assessment opinion in part because one of his calculations necessitated a lethal level of gasoline even though the expert later withdrew the opinion). Miller made his calculations in a vacuum without any attempt to validate his results against reality. Specifically, until defense counsel pointed out his error, Miller failed to recognize that the evidence, which provided no indication Mr. Burst or his co-workers sustained acute overexposure to gasoline, was not consistent with his result. Moreover, Miller also failed to validate his results against existing scientific literature, including a study on which he relied elsewhere in his report, that demonstrated why his result had to be wrong. These failings speak to a lack of intellectual rigor in Miller's approach to the issues under discussion.

Miller now tries to rationalize his approach by stating that three components of gasoline would have evaporated faster than benzene, but that benzene evaporates faster than "most" other components of gasoline, which he does not identify. But Miller cannot deny that the other components of gasoline would have

evaporated at some rate.[26] He now assumes that everything that evaporated, except the benzene, escaped the garage through leaks. Yet, in his report, he assumes that the room was airtight with “no significant ventilation” that would have permitted the benzene to escape over the course of “subsequent work days.”[27] Miller fails to explain how he can have it both ways. His post hoc rationalization does not salvage his methodology on this issue.

B. Miller's Estimate of Mr. Burst's Benzene Exposure from Dermal Exposure during Parts and Hands Washing

Several witnesses have testified that Mr. Burst frequently washed his hands and parts in a bucket of gasoline during the workday. For example, Ms. Burst testified that Mr. Burst would "remove a part that was soaking in gasoline from a bucket with his bare hands, and then wipe the part with a shop rag to remove the grease from the part."[28] Mr. Simpson also testified that he and Mr. Burst cleaned parts in gasoline while performing mechanic work. Specifically, Mr. Simpson stated that he spent approximately 15% to 20% of his day cleaning parts in a two-gallon bucket approximately halfway full of gasoline.[29] Mr. Bernard testified that the bucket

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[26] In his report, Miller assumes that “two or possibly three gallons of gasoline-benzene mixture may have evaporated [from the parts-washing bucket] over the course of a day.” R. Doc. 87, Ex. A at 25.

[27] *Id.*

[28] *Id.* at 18.

[29] *Id.* at 27.

contained "three or four inches" of gasoline.[30] Mr. Simpson also testified that he and Mr. Burst washed their hands in gasoline after performing mechanic work.[31] Mr. Simpson, however, stated that he "probably cleaned [his] hands a lot more than Mr. Burst," and he did not expressly state what percentage of time Mr. Burst spent washing parts.[32] Still, Mr. Simpson stated that cleaning his hands was "a constant process" because he needed to alternate between mechanic work and pumping gas.[33] Charles Bernard also testified that on most days Mr. Burst would have performed mechanic work necessitating that he wash his hands in gasoline multiple times per day.[34] From this testimony, Miller concluded that "it is clear that the attendants were constantly washing their hands in gasoline."[35]

Miller sought to calculate Mr. Burst's cumulative dermal exposure--how much benzene Mr. Burst absorbed through his skin--from washing parts and his hands in gasoline over the course of one year. At his deposition, Miller conceded that he has never

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[30] *Id.* at 20. Miller noted that Mr. Simpson and Ms. Burst testified that the bucket contained one gallon of gasoline. *Id.*

[31] *Id.*

[32] *Id.*

[33] *Id.*

[34] *Id.* at 19.

[35] *Id.* at 28.

calculated a dermal dose outside of the context of litigation.[36] In making his assessment, Miller relied on studies describing the flux rate of pure benzene through human skin.[37] Miller stated that he increased the flux rate described in the literature he cited by a magnitude of five because Ms. Burst testified that Mr. Burst had nicks and scratches on his hands from mechanic work.[38] But without stating why, Miller did not incorporate the increased flux rate into his final calculation.

Despite the divergent testimony as to the size and amount of gasoline in the parts-washing bucket,[39] Miller assumed that Mr. Burst submerged both his hands and forearms, up to his elbows, in

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[36] R. Doc. 87, Ex. B at 8.

[37] R. Doc. 87, Ex. A at 28. It is unclear whether the flux rate of pure benzene is comparable to the flux rate of benzene as a component of gasoline.

[38] In support of his decision to increase the flux rate, Miller relied on a paper, Maibach, HI, *et al.*, *Percutaneous Penetration of Benzene and Benzene Contained in Solvents Used in the Rubber Industry*, 36 ARCH ENVIRON HEALTH 256 (1981), showing that the flux rate of pure benzene through the artificially damaged skin of Rhesus monkeys increases significantly. In this study, the researchers stripped away the stratum corneum from the monkeys' skin before applying benzene and measuring its flux rate.

[39] R. Doc. 105, Ex. 4 at 35 (deposition of Mr. Simpson) (stating that they used a two-gallon bucket halfway or 30% full of gasoline); R. Doc. 87, Ex. A at 20 (testimony of Mr. Bernard) (stating the they used a pail with the diameter of a five-gallon bucket that was six inches high with three or four inches of gasoline in it); R. Doc. 105, Ex. 15 at 2 (testimony of Ms. Burst) (stating that the bucket was either two or five gallons and was filled halfway with gas).

gasoline "[b]ecause of the depth of the bucket and the amount of gasoline (1 gallon) involved."[40] This assumption is significant as Miller's calculation used the surface area of exposed skin as a variable, and this assumption resulted in a significantly larger surface area of exposed skin than if Miller assumed Mr. Burst submerged only his hands in gasoline.[41]

With these figures, Miller ran two "Monte Carlo" simulations. A Monte Carlo simulation is "a risk assessment model that accounts for variability and uncertainty in risk factors," such as the variation in the time of Mr. Burst's dermal exposure to gasoline. *Schultz v. Akzo Nobel Paints, LLC*, 721 F.3d 426, 428 (7th Cir. 2013). The Environmental Protection Agency endorses this methodology for evaluating risk arising from environmental exposures. *See id.* (highlighting "the EPA's position that such probabilistic analysis techniques as Monte Carlo analysis, given adequate supporting data and credible assumptions, can be viable statistical tools for analyzing variability and uncertainty in risk assessments" (quoting EPA, Office of the Scientific Advisor, *Guiding Principles for Monte Carlo Analysis*, http://www.epa.gov/raf/publications/guiding-monte-carlo-analysis.htm)). The simulation "creates a large number of model estimates by selecting alternative values for the model's

[40] R. Doc. 87, Ex. A at 29.

[41] *See id.*

assumptions." *Hammes v. Yamaha Motor Corp. U.S.A.*, No. 03-6456(MJD/JSM), 2006 WL 1195907, at *9 (D. Minn. May 4, 2006). "The assumption values are selected from distributions of likely values which are specified by the analyst." *Id.* The assumption values take the form of a range using all possibilities between a minimum and a maximum value for whatever variables are uncertain.[42] The completed simulation produces a range of results based on the random input values, each with a corresponding likelihood. For example, if the model generated a particular result during only 30% of the simulations, there is only a 30% chance that that result will occur in an individual trial. The model "is particularly useful when reaching an exact numerical result is impossible or infeasible and the data provide a known range--a minimum and a maximum, for example--but leave the exact answer uncertain." *Lyondell Chem. Co. v. Occidental Chem. Corp.*, 608 F.3d 284, 293 (5th Cir. 2010).

Miller's first simulation included two uncertain variables, and thus included two ranges: (1) the number of hours Mr. Burst's forearms and hands experienced dermal exposure to benzene from parts washing, and (2) the flux rate of benzene.[43] For hours

[42] For example, if an analyst were to use a Monte Carlo analysis to estimate the range of possibilities of the time of completion of a project, the analyst would establish a range using the predicted minimum and maximum amount of time it will take to complete the project.

[43] R. Doc. 87, Ex. A at 30.

exposed--that is, hours in which Mr. Burst's hands and forearms were actually wet with gasoline--Miller assumed a minimum contact time of 375 hours (1.25 hours per day for 300 days per year) and a maximum contact time of 3150 hours (10.5 hours per day for 300 days per year).[44] Miller based the minimum value on his assumption that, at a minimum, Mr. Burst cleaned parts five times per day in 15-minute intervals. This assumption is contrary to Mr. Bernard's testimony that Mr. Burst performed mechanic work and washed his hands and parts in gasoline on *most* days, not all days. Miller based the maximum value on his assumption that, at most, Mr. Burst's hands and forearms were wet with gasoline 10.5 hours per day, the equivalent of an *entire* workday.[45] This assumption is based on Mr. Simpson's testimony that the attendants engaged in a "constant process" of alternating between refueling cars and completing mechanic work. For the benzene flux rate, Miller used a range of 0.099 $mg/cm^2/hr$ to 1.85 $mg/cm^2/hr$,[46] which represented the low and high flux rates observed in the scientific literature cited by Miller on the flux rate of pure benzene. In a second Monte

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[44] *Id.*

[45] Q: You assumed that Mr. Burst's hands, on the high end of your Monte Carlo, were wet on average from the second he walked in the door until the second he left?
A: Yes.
Q: All 10.5 hours?
A: Yes.
R. Doc. 105, Ex. 2 at 60 (deposition of Richard Miller).

[46] R. Doc. 87, Ex. A at 30.

Carlo simulation, Miller kept the hours and flux rate ranges the same, and added another uncertain variable: the concentration of benzene in the gasoline. Miller used a 1% benzene concentration as the minimum of the range and a 2% benzene concentration as the maximum of the range.[47] The first simulation yielded a 45th percentile (more likely than not) cumulative dermal benzene exposure for parts washing of 37.367 ppm-years and the second simulation yielded a 45th percentile dermal benzene exposure of 53.861 ppm-years.[48]

The Court finds Miller's estimate of Mr. Burst's dermal exposure to benzene from washing parts unreliable because Miller's assumption that Mr. Burst's hands and forearms were wet with gasoline for a minimum of 1.25 hours per day and a maximum of 10.5 hours per day is inconsistent with the factual record and failed to account for evaporation.

First, the Court finds Miller's methodology unreliable because Miller's assumption regarding the minimum and maximum time that Mr. Burst's hands and forearms could have been wet with gasoline is not supported by the factual record. *See Moore v. International Paint, L.L.C.*, 574 Fed. Appx. 513, 515 (5th Cir. 2013) ("When an expert's testimony is 'not based upon the facts in the record but on altered

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[47] *Id.* at 30.

[48] *Id.* at 31. This means that in an individual trial, it is expected that these results will occur 55% of the time.

facts and speculation designed to bolster [a party's] position,' the trial court should exclude it.") (quoting *Guillory v. Domtar Indus., Inc.*, 95 F.3d 1320, 1331 (5th Cir. 1996)). Contrary to Miller's assumption, the witness testimony demonstrates that Mr. Burst's hands were wet with gasoline far less than 10.5 hours per day, and, on some days, were not exposed to gasoline through parts washing at all. Mr. Simpson testified that he personally spent only 15% to 20% of his day washing parts. Similarly, Mr. Bernard testified that Mr. Burst would have needed to utilize the parts-washing bucket to wash his hands on *most* days, not on all days. There is no testimony indicating how long Mr. Burst submerged his hands and forearms in gasoline while cleaning parts. The only piece of evidence that could possibly support the inference that Mr. Burst's hands were wet with gasoline all day is Mr. Simpson's testimony that, for him, hand washing was a "constant process" because he had to run in and out of the mechanic's area between refueling cars, although he stated that he probably washed his hands more than Mr. Burst. In his unsworn affidavit, Miller explained that he interpreted this testimony to mean that the "skin exposure was intermittent, but repeated each time a car entered the pump area--making the exposure essentially continuous."[49] Likewise, in his report, Miller stated: "This amounted to a skin exposure

[49] R. Doc. 105, Ex. 3 at 5.

that was essentially constant."[50] Miller's assumption of continuous exposure from a factual record that shows that the exposure was intermittent is problematic, especially as Mr. Simpson testified he spent only 15% to 20% of the day washing parts. Miller's reliance on Simpson's use of the word "constant," which Simpson did not use to describe the length of time Mr. Burst's hands were actually wet with gasoline, to reach a conclusion with no other factual support suggests a methodology that is result driven.

By the same token, Miller's selection of 1.25 hours as Mr. Burst's minimum daily exposure is suspect. Mr. Bernard testified that Mr. Burst would have experienced this exposure on *most* days, not on all days. Given that a Monte Carlo simulation attempts to gauge all possibilities within a range of all potential periods of exposure, Miller inexplicably failed to account for zero hours as the minimum of the range.

Second, Miller's opinion is unreliable because his report does not account for the effect of evaporation in assuming that Mr. Burst's hands could have been wet with gasoline for a minimum of 1.25 hours per day and a maximum of 10.5 hours per day. Jennifer Sahmel, defendants' expert industrial hygienist, opines that, as a result of evaporation, Mr. Burst would have had much shorter lengths of dermal exposure to gasoline than estimated by Miller.[51]

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[50] R. Doc. 87, Ex. A at 26.

[51] R. Doc. 87, Ex. C at 88.

In support, Sahmel points to studies showing that "far less than 1% of benzene that is applied to the skin is available for absorption."[52] Although not in his report, Miller stated at his deposition that he separately calculated that it would "take about a minute or a little longer for the [gasoline] to evaporate" from Mr. Burst's hands.[53] Explaining why he did not account for the effect of evaporation in this section of his report, Miller speculated that the perspiration likely present on Mr. Burst's hands or the humidity likely negated the effect of evaporation. Unfortunately, Miller cites no specific facts or data to support these factual assumptions. There is no evidence that Mr. Burst's hands and forearms perspired constantly or that humidity always prevented evaporation of gasoline from his skin. Moreover, Miller assumes elsewhere in his report that for two months a year, it was too cold every single day to leave the garage doors open. This assumption is inconsistent with the assumption that Mr. Burst's hands and forearms were covered in perspiration those same days. That Miller never dealt with the effects of evaporation in his report and then engages in this type of speculation to explain away a potentially inconvenient phenomenon contributes to the overall unreliability of his analysis.

Miller's failure to treat evaporation in this segment of his

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[52] *Id.*

[53] R. Doc. 87, Ex. B at 34.

report is telling because Miller discusses and even accounts for evaporation elsewhere in his report. For example, Miller stated that "both gasoline and benzene evaporate into the surrounding environment."[54] Miller also opined that "it would be common to have gasoline evaporate from the pavement," which could be inhaled by gasoline station attendants.[55] Miller even calculated how much gasoline would have evaporated from the parts-washing bucket over the course of a day.[56] This inconsistency is especially problematic from a reliability standpoint because Miller accounted for evaporation when it increased his cumulative exposure estimate as with his inhalation exposure estimate for the parts-washing bucket, but did not account for evaporation in this section of his report when it would likely have decreased his estimate significantly.[57]

The Court has considered the explanation that Miller supplied in his deposition that the Monte Carlo simulation accounts for uncertainties like evaporation. As the Court understands Miller's explanation, Miller asserts that because he used a range (1.25 hours/day to 10.5 hours/day) and because the Monte Carlo simulation

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[54] R. Doc. 87, Ex. A at 13.

[55] *Id.* at 17.

[56] *Id.* at 22.

[57] See R. Doc. 87, Ex. C at 89 where Sahmel notes that "it is contradictory to assume that all benzene evaporated when considering inhalation exposure, but to completely ignore evaporation when considering dermal exposure."

randomly chooses a point within this range during each trial, the Monte Carlo simulation accounted for days when exposure would have been less, such as when evaporation caused Mr. Burst's time of exposure to be lower. Nevertheless, it cannot be denied that Miller did not consider the effects of evaporation when establishing the range, and that the scope of the range impacts the final result. For example, Miller's assumption that Mr. Burst's hands and forearms were wet with gasoline for a minimum of 1.25 hours per day did not account for evaporation. Had Miller considered the effect of evaporation, he likely would have selected a lower minimum input, which would have reduced the final exposure estimate.[58] Given that the Monte Carlo simulation will yield different results as a result of differences in chosen inputs, "it stands to reason that if the data from which [Miller's] modeling assumptions arise is invalid, or non-existent, then there is no hope that his technique, much less his results, is going to be reliable." *Castellow*, 97 F. Supp. 2d at 792. *See also Lyondell Chem. Co.*, 608 F.3d at 294 (citing cases that "stand for the proposition that Monte Carlo analysis is unreliable when injected with faulty inputs" and noting that courts can "gauge reliability by examining input values and requiring transparency from testifying experts"); *In re Application of Erie Blvd. Hydropower*

[58] Likewise, had Miller considered Mr. Bernard's testimony that Mr. Burst cleaned his hands and parts on most days, not on all days, he likely would have selected a lower minimum input.

L.P. v. Town of Ephratah Bd. of Assessors, No. 17-1-2000-0331, 2003 WL 21172636, at *4 (N.Y. Sup. Ct. Apr. 11, 2003) (“[A]ll you are doing in a Monte Carlo simulation is coming back to your own assumptions, so whatever went in comes out. Stated differently, if you make bad assumptions, you obtain bad outputs.”).

C. Miller Estimate for Inhalation Exposure from Washing Parts

Miller's estimate for Mr. Burst's benzene exposure from inhaling gasoline vapors while washing parts is unreliable because Miller relied solely on the self-reported symptoms from Ms. Burst from almost 50 years ago while failing to show that this is a reliable methodology, and failed to validate his results against scientific literature measuring actual exposure levels.

To calculate Mr. Burst's inhalation exposure from washing parts, Miller started by determining the concentration of gasoline vapors present during this activity. Miller relied on Ms. Burst's testimony that she watched Mr. Burst wash parts on approximately two days per week, and that she became "lightheaded from the gasoline vapor in the room" after fifteen minutes.[59] Miller then cited a study showing that exposure to a concentration of 3000 ppm gasoline vapor for fifteen minutes can cause "slight dizziness and irritation of the eyes, nose and throat."[60] Because Ms. Burst testified that she experienced lightheadedness after fifteen

[59] R. Doc. 87, Ex. A at 18.

[60] *Id.*

minutes, Miller concluded that "it is reasonable to assume that both she and her husband were exposed to 3000 parts per million gasoline vapor."[61] Yet, there is no evidence in the record that Mr. Burst ever experienced any symptoms while washing parts or performing any of his duties. Using this figure, Miller relied on a study showing that 300 ppm gasoline containing 1% benzene is associated with 1.8 ppm benzene in the air.[62] Because Miller assumed that Mr. Burst was exposed to 3000 ppm of gasoline, based on his wife's self-reported symptoms recalled almost 50 years after the fact, Miller simply multiplied the results of that study by ten to reach an estimate of 18 ppm benzene.[63]

Miller then calculated how often Mr. Burst experienced this exposure. Mr. Simpson testified that he and Mr. Burst spent 40% of their time performing mechanic work, and that he spent 15% to 20% of the time cleaning parts.[64] Mr. Bernard testified that Mr. Burst may have performed mechanic work necessitating parts washing

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[61] *Id.*

[62] *Id.* at 19. This translates to a 166.67:1 ratio between gasoline and benzene.

[63] *Id.* Because 3000 divided by 300 is 10, Miller multiplied the study's figure, 1.8 ppm, by 10 to reach 18 ppm. At his deposition, Miller explained that he could extrapolate the data from this study because the ratio of gasoline to benzene when the benzene concentration is 1% is linear. In doing so, Miller assumed that the gasoline to which Mr. Burst was exposed contained 1% benzene.

[64] *Id.* at 19-20.

multiple times per day.[65] From this testimony, Miller assumed that Mr. Burst was exposed to 18 ppm benzene at least five times during each day for durations of 15 minutes each.[66] Assuming a 10.5 hour workday, a benzene concentration of 1% in gasoline, and that Mr. Burst spent 15% of his day cleaning parts, Miller estimated that Mr. Burst's cumulative inhalation exposure from parts washing was 4.089 ppm-years.[67]

Defendants assert that this estimate is unreliable because Miller ignored the relevant data from the scientific literature, and instead relied on the self-reported symptoms of Ms. Burst to calculate exposure. In her critique of Miller, Sahmel states that the "effect threshold of gasoline," especially as reported by Ms. Burst, a secondary source, not Mr. Burst himself, is not a reliable indicator of the airborne concentration of gasoline/benzene.[68] She explains:

> Mr. Miller's use of a second party's reported symptoms of lightheadedness or dizziness recalled from an exposure that occurred decades earlier to the spouse of the worker to estimate the inhalation exposure to benzene during washing parts with gasoline is not an appropriate exposure assessment methodology. Odor and irritation thresholds are also not recognized in the field of

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[65] *Id.* at 19.

[66] *Id.* at 20.

[67] *Id.* at 21. Assuming Mr. Burst cleaned parts for 20% of the day, Miller estimated a cumulative inhalation exposure from parts washing of 5.45 ppm-years. *Id.*

[68] R. Doc. 87, Ex. C at 80.

> industrial hygiene or risk assessment as reliable methods of estimating exposure to airborne chemicals in the workplace. This type of approach is considered unreliable because there is significant intra- and inter-human variability in detection and perception of odors at different concentration levels (AIHA 1989; Keller 2007). Research has shown that the presence of an odor can result in self-reported symptoms unrelated to the chemical itself, such as reports of irritation following exposure to phenylethyl alcohol (PEA), which has a detectable odor, but no ability to cause irritation (Dalton 2001). Williams and Lees-Haley (1997) have shown in a volunteer survey that the stated presence or absence of a gasoline odor is likely to influence people's assumptions about causality. The authors concluded that when an odor is present, "headache, sore throats, sleeplessness, and other minor preexisting conditions could be attributed erroneously to toxic exposure, especially if uncertainty surrounded the initial consideration of etiology (p. 416)." (Williams 1997).[69]

She asserts that Miller should have instead relied on collection of air concentration data, an evaluation of published literature on measured airborne chemical concentrations, or estimation of chemical exposure concentrations based on accepted models or calculations.[70]

In response, Miller does not cite any source indicating that his methodology is accepted or any study that utilized his methodology. When asked whether OSHA endorses his methodology, Miller stated that "OSHA has nothing to say about it one way or the other."[71] Miller also seemed to indicate that OSHA would not make

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[69] *Id.* at 81.

[70] *Id.* at 82.

[71] R. Doc. 105, Ex. 2 at 119.

any exposure assessment conclusions from self-reported symptoms alone.[72] At the same time, Miller asserted that an industrial hygienist must pay attention to this information.[73] Notably, Miller could not cite any literature identifying his methodology as one that is reliable, and he even admitted that he did not conduct any research prior to completing his report to determine whether his methodology had been criticized in the published literature.[74] Even after reading defendants' expert's report, Miller stated that he had not reviewed the studies she cited showing why his methodology is unreliable.[75] Miller insists that he relied on scientific literature--the studies examining symptoms resulting from varying concentrations of gasoline vapor, but these studies observed symptoms resulting from *known* quantities of gasoline; they did not calculate gasoline vapor levels from symptoms. Ultimately, there is no evidence in the record besides Miller's own assurances to suggest that non-contemporaneous self-reported symptoms of a secondary source can form the sole basis for an exposure assessment opinion. In the face of Sahmel's criticism, which is supported by

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[72] "And OSHA does not cite [] an estimated exposure by somebody who said I have watery eyes in styrene; it's 300 parts per million. OSHA is not going to cite that, but as an industrial hygienist, you have to pay attention to it." *Id.* at 119-20 (deposition of Richard Miller).

[73] *Id.*

[74] *Id.* at 122.

[75] *Id.* at 123.

multiple studies, and nothing but the *ipse dixit* of Miller, Miller fails to show that his methodology is reliable. *See Joiner*, 522 U.S. at 146.

Plaintiff cites *Curtis v. M&S Petroleum, Inc.*, 174 F.3d 661 (5th Cir. 1999), for the proposition that reliance on self-reported symptoms is an accepted methodology, but this case is inapposite. There, the Fifth Circuit endorsed an expert's methodology when the expert relied on not only contemporaneously self-reported symptoms of the workers, but also on actual contemporaneous exposure measurements, in addition to several other factors. *Id.* at 671-72. Unlike the methodology examined in *Curtis*, Miller's methodology is unreliable because he relied solely on self-reported symptoms to formulate his estimate. Moreover, Miller relies on the self-reported symptoms from a secondary source from almost 50 years ago. This is not to suggest that reasonably contemporaneous self-reported symptoms are irrelevant or that they cannot form part of the basis for an expert exposure opinion. But, here, Miller relies solely on self-reported symptoms from a secondary source from almost 50 years ago and there is no other evidence in the record that would buttress the reliability of this methodology.[76]

[76] Plaintiff also cites *Arabie v. CITGO Petroleum Corp.*, 89 So. 3d 307, 321 (La. 2012), to support her argument that Miller's sole reliance on Ms. Burst's self-reported symptoms is reliable. In *Arabie*, however, the issue of whether an expert's reliance on self-reported symptoms is a reliable methodology was not before that court.

Miller's methodology is also unreliable because he failed to validate his result against any study that measured actual exposure levels. While validation against such studies is likely not necessary in every case, other courts have recognized that in the presence of comparable scientific data measuring actual exposures, an expert, at the very least, should validate an exposure assessment based on modeling against the scientific literature. *See, e.g.*, *Castellow*, 97 F. Supp. at 791 (excluding an expert's exposure assessment partially because he failed to validate his modeling assessment with comparable monitoring data from the scientific literature). Miller himself states that "peer reviewed papers and articles should augment and elucidate eyewitness testimony and data associated with specific occupational activity . . . ."[77] Here, it appears that such validation would have been especially important because Miller relied solely on the self-reported symptoms of a single individual, a secondary source, from almost 50 years ago, and there is no evidence that Mr. Burst experienced the same symptoms. Moreover, as cited by Sahmel, numerous studies exist that measured actual exposure levels of gasoline station service attendants performing the same tasks as Mr. Burst. In fact, one of the studies cited by Miller to demonstrate what symptoms result from varying gasoline vapor concentrations, Runion (1975), separately found, as explained by

[77] R. Doc. 105, Ex. 3 at 4.

Sahmel, that inhalation exposure from parts washing was substantially less than Miller's estimate (0.37 ppm compared to Miller's estimated 18 ppm).[78] Despite citing this study for a separate reason multiple times in his report, Miller offers no explanation for why he failed to acknowledge its measurement of actual exposure levels during the exact activity Mr. Burst performed. Just as Miller failed to validate his other inhalation estimate against studies showing that gasoline concentrations above 5000 ppm are lethal after only five minutes of exposure, Miller failed to validate this inhalation exposure estimate against

[78] See R. Doc. 87, Ex. C at 83 where Sahmel states that Miller failed "to consider full data sets cited in his own report indicating that the benzene exposure concentration during gasoline parts washing is most likely less than 1 ppm. The Runion (1975) study that he cited stated that 'Limited tests in an enclosed room indicated that when such work was being done, 100 ppm total hydrocarbons would be reached frequently in the breathing zone in the absence of positive ventilation p. 340.' Specifically, Gulf No-Nox gasoline was found to contain 1.10% benzene by volume (Runion 1975). It was also found that the benzene volume percentage in the vapor phase for Gulf No-Nox gasoline was 0.37%. Assuming that 100 ppm was the total gasoline vapor concentration during parts cleaning, the benzene concentration during parts cleaning would be approximately 0.37 ppm, not 18 ppm as estimated by Mr. Miller based on reported symptoms of dizziness from Mrs. Burst when she visited the garage at the end of the work day." Neither Miller nor plaintiff challenge this opinion.

Plaintiff contends that Sahmel ignored the results of Runion (1982), which reported gasoline concentration ranges of 150-240 ppm for brushing parts in gasoline, 300-425 ppm for gear removed to work table to dry, and 500-700 ppm for doors open creating a draft. *See* R. Doc. 105, Ex. 5 at 44. Applying Sahmel's analysis to these results, however, still demonstrates benzene concentration levels significantly less than that estimated by Miller.

studies measuring actual exposures. Instead, Miller accepts witness testimony outright without any attempt to validate his results against scientific literature.

Again, Miller asserts that "published literature was used: Tironi--which in turn referenced Runion's papers which in turn referenced various exposure scenarios involving dizziness within 15 minutes."[79] As stated, however, Miller relied on these studies for their observation of symptoms associated with known concentrations of gasoline vapors. Miller never compared his result to any measurements of actual exposure levels, including that provided in Runion.

E. Conclusion

After a review of Miller's report, the witness testimony, and the parties' exhibits and briefing, the Court concludes that Miller's opinions on the nature of Mr. Burst's exposures are undermined by their reliance on speculation. Miller's opinions are not based on adequate data and instead demonstrate an effort to produce particular results and support a causation opinion without a reliable basis. While Miller relies on witness testimony, in significant instances he does so unreasonably and in a manner intended to raise his exposure assessment. Moreover, Miller makes significant assumptions in some instances without any factual basis for doing so. He ignores evaporation when it is harmful to his

[79] R. Doc. 105, Ex. 3 at 6.

assessment, but accounts for it when it is helpful. Compounding Miller's unreasonable and often unfounded assumptions is Miller's failure to engage in any critical evaluation of his modeling results against empirical scientific literature measuring actual exposure levels. Instead, Miller accepts witness testimony outright and only selectively chooses when to rely on scientific literature. Cumulatively, Miller's methodology produces an exposure assessment that is likely artificially high and that is not reasonably based on the factual record but instead on speculation. For all of these reasons, the Court finds that Miller's opinion as to Mr. Burst's exposure to benzene from defendants' products is unreliable and is therefore inadmissible.

IV. CONCLUSION

For the foregoing reasons, the Court GRANTS defendants' motion to exclude the report and the testimony of Richard Miller.

New Orleans, Louisiana, this 14th day of May, 2015.

Sarah Vance

SARAH S. VANCE

UNITED STATES DISTRICT JUDGE