

IN THE SUPERIOR COURT OF THE STATE OF DELAWARE

ANAJAI CALCAÑO PALLANO, et al.,)
)
Plaintiffs,)
)
v.) C.A. No. N09C-11-021 JRJ
)
THE AES CORPORTATION, et al.,)
)
Defendants.)

OPINION

Date Submitted: December 4, 2015

Date Decided: February 26, 2016

*Upon Defendants' Daubert Motion to Exclude the Testimony of Mr. Scott D. Reynolds: **GRANTED in part, and DENIED in part.***

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Jurden, P.J.

I. INTRODUCTION

This litigation arises out of the alleged unlawful dumping of toxic industrial waste (“Coal Ash Waste” or “Waste”) in the Dominican Republic by The AES Corporation (“AES”) and four of its wholly owned subsidiaries, AES Atlantis, Inc.; AES Puerto Rico, LP; AES Puerto Rico, Inc.; and AES Puerto Rico Services, Inc. (collectively “Defendants”).¹ Plaintiffs, residents of the Dominican Republic, allege they were “wrongfully exposed to reproductive, carcinogenic, and other toxins in the Coal Ash Waste, either directly or *in utero*, and as a result suffered severe personal injuries, including birth defects and death.”² These birth defects include, but are not limited to, conjoined twins, missing limbs, missing organs, internal organs extruding from the body, cranial and bony malformations, central nervous system injuries, and gastrointestinal deformities.³

The *Daubert* motion *sub judice* is just one of nineteen filed by the parties in this hotly and heavily litigated dispute.⁴

For the reasons set forth below, Defendants’ *Daubert* Motion to Exclude the

¹ Second Amended Complaint ¶¶ 1, 4 (“SAC”) (Trans. ID. 40099941).

² *Id.* ¶ 16.

³ *Id.* ¶ 2.

⁴ The parties have filed fifty-four briefs in connection with the nineteen *Daubert* Motions. Defendants have challenged seven of Plaintiffs’ causation experts and four of Plaintiffs’ exposure experts. Plaintiffs have challenged six of Defendants’ causation experts and two of Defendants’ exposure experts. The parties submitted twenty-six Joint *Daubert* Exhibits, which include each expert’s report, deposition, and curriculum vitae (“J. Ex.”) (Trans. ID. 57342400). See J.Ex. 11.A Scott D. Reynolds, MS, PE, M/E Engineering PC, Computational Fluid Dynamics Models of Fly Ash Dispersion from an AES Ash Dumpsite during Dumping and Removal Operations in Arroyo Barril, Dominican Republic, 2004–2008 (“Reynolds Expert Report”).

Testimony of Mr. Scott D. Reynolds is **GRANTED in part, and DENIED in part.**

II. BACKGROUND

Defendants operate power plants that burn coal for the purpose of generating energy.⁵ Defendants' coal-fired power plants produce coal combustion by-products, specifically solid waste comprised of fly ash and bottom ash, also known as Coal Ash Waste.⁶ Coal Ash Waste contains arsenic, cadmium, nickel, beryllium, chromium, lead, mercury, and vanadium.⁷ Plaintiffs assert that it is "well known" that these substances cause birth defects and "other adverse reproductive outcomes, including cancer of the lung, kidney, bladder and skin, as well as respiratory illnesses and other disorders."⁸

Plaintiffs allege that, prior to October 2003, Defendants built a coal-fired power plant in Guayama, Puerto Rico ("AES Puerto Rico"), and Puerto Rican

⁵ SAC ¶ 5.

⁶ *Id.* Defendants admit that its coal-fired power plants generate "coal combustion products" but refer to the coal combustion products as "Manufactured Aggregate," rather than "Coal Ash Waste." Defendants' Answer and Affirmative Defense to Plaintiffs' Second Amended Complaint ¶¶ 5–6 ("Defs.' Ans. SAC") (Trans. ID. 44610320). According to Defendants, manufactured aggregate is "created by hardening a mixture of fly ash and bottom ash through a chemical hydration reaction and curing process [and] has a low potential for dust emissions." AES's *Daubert* Motion No. 10 to Exclude the Testimony of Mr. William Konicki at 1 (Trans. ID. 57346412). The Court refers to the "coal combustion product" as "Coal Ash Waste," the term used in the Second Amended Complaint.

⁷ SAC ¶ 6. Defendants admit that the "coal combustion products may contain trace amounts of arsenic, cadmium, nickel, beryllium, chromium, lead, mercury and vanadium." Defs.' Ans. SAC ¶ 6. However, Defendants allege that the concentrations are too low to be hazardous to human health. *Id.*

⁸ SAC ¶ 16.

officials required Defendants to transport and dispose of the Coal Ash Waste generated at that plant outside of Puerto Rico.⁹ As a result, from October 2003 until March 2004, Plaintiffs allege Defendants dumped thousands of tons of Coal Ash Waste on beaches in the Dominican Republic, including at the Arroyo Barril port located in the Samaná Province.¹⁰ According to Plaintiffs, Coal Ash Waste containing hazardously high levels of toxins was deposited directly on a beach in Arroyo Barril located near Plaintiffs' homes, workplaces, and recreational sites.¹¹ Plaintiffs contend that the Coal Ash Waste was carried by wind and water to the local residential areas, and consequently, the Plaintiffs were exposed to dangerous levels of toxic materials contained in that Waste.¹²

As a result of this exposure, Plaintiffs allege the following injuries. Minor Plaintiff Maximiliano Calcaño was born on November 24, 2007, with multiple birth defects, including missing limbs.¹³ Plaintiff Anajai Calcaño Pallano, individually, and as mother and natural guardian, brings suit on behalf of Maximiliano.¹⁴

Minor Plaintiff "Baby Mercedes" died shortly after birth on May 21, 2009,

⁹ *Id.* ¶ 7.

¹⁰ *Id.* ¶¶ 10–11.

¹¹ *Id.*

¹² *Id.* ¶¶ 57–58, 68.

¹³ *Id.* ¶ 17.

¹⁴ *Id.*

as a result of a failed “Siamese twinning.”¹⁵ Plaintiff Maribel Mercedes, individually, and as personal representative of the estate of Baby Mercedes, brings suit on behalf of Baby Mercedes.¹⁶

Minor Plaintiff Isael Altagracia Andujar was born on December 18, 2005, with “severe gastrointestinal anomalies, among other injuries.”¹⁷ Plaintiff Maribel Andujar Medina, individually, and as mother and natural guardian, brings suit on behalf of Isael.¹⁸

Minor “Baby Olmos,” was born on July 23, 2008, “with severe gastrointestinal deformities and other birth defects, and died shortly thereafter.”¹⁹ Plaintiff Rosa Maria Andujar, individually, and as personal representative of the estate of Baby Olmos, brings suit on behalf of Baby Olmos.²⁰

Minor Plaintiff Estanlyn Garcia Deogracia was born on March 8, 2008, “with birth defects, including bony anomalies and an absent kidney.”²¹ Plaintiff Maria Virgen Deogracia, individually, and as mother and natural guardian, brings suit on behalf of Estanlyn.²²

Plaintiff Amparo Andujar alleges that, after approximately four months of

¹⁵ *Id.* ¶ 18.

¹⁶ *Id.*

¹⁷ *Id.* ¶ 19.

¹⁸ *Id.*

¹⁹ *Id.* ¶ 20.

²⁰ *Id.*

²¹ *Id.* ¶ 21.

²² *Id.*

pregnancy in 2008, she had to undergo a therapeutic abortion because her physician believed that the “fetus exhibited several cranial and/or other anomalies and was no longer viable.”²³

III. DAUBERT ANALYSIS

Delaware Rule of Evidence 702 governs the admission of expert testimony.

D.R.E. 702 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.

D.R.E. 702 is identical to its federal counterpart, Rule 702 of the Federal Rules of Evidence, which is governed by *Daubert v. Merrell Dow Pharmaceuticals, Inc.*²⁴ The Delaware Supreme Court has expressly adopted *Daubert* and its progeny.²⁵

Under D.R.E. 702, the trial judge acts as gatekeeper to ensure that scientific testimony is both relevant and reliable.²⁶ “The foci of a *Daubert* analysis are the

²³ *Id.* ¶ 22.

²⁴ *Bowen v. E.I. DuPont de Nemours & Co.*, 906 A.2d 787, 794 (Del. 2006). *See Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).

²⁵ *Tumlinson v. Advanced Micro Devices, Inc.*, 81 A.3d 1264, 1269 (Del. 2013) (internal quotations omitted).

²⁶ *Bowen*, 906 A.2d at 794 (“The trial judge acts as the ‘gatekeeper’ in deciding whether an expert’s testimony ‘has a reliable basis in the knowledge and experience of [the relevant]

‘principles and methodology’ used in formulating an expert’s testimony, not [] the expert’s resultant conclusions.”²⁷ *Daubert* sets forth several non-exclusive factors to assist the trial judge in determining whether an expert’s opinion is reliable, including testing, peer review, error rates, and acceptability in the relevant scientific community.²⁸

Consistent with *Daubert*, in Delaware the trial judge must determine whether:

- (1) the witness is qualified as an expert by knowledge, skill experience, training or education;
- (2) the evidence is relevant;
- (3) the expert’s opinion is based upon information reasonably relied upon by experts in the particular field;
- (4) the expert testimony will assist the trier of fact to understand the evidence or to determine a fact in issue; and
- (5) the expert testimony will not create unfair prejudice or confuse or mislead the jury.²⁹

The party offering the testimony bears the burden of establishing its admissibility by a preponderance of the evidence.³⁰ Because trial judges perform an important gatekeeping function, the Delaware Supreme Court has afforded trial judges “considerable leeway in deciding in a particular case how to go about

discipline.”).

²⁷ *Id.* (citing *Daubert*, 509 U.S. at 595).

²⁸ *Id.*

²⁹ *Id.* at 795.

³⁰ *Id.* at 794–95.

determining whether particular expert testimony is reliable.”³¹

IV. DISCUSSION

A. Plaintiffs’ Expert Scott D. Reynolds

Scott D. Reynolds (“Reynolds”) is a registered professional engineer with a Bachelor of Science in Mechanical and Industrial Engineering and a Master of Science in Mechanical and Aerospace Engineering.³² Reynolds is the founder of Computer Aided Engineering Solutions and has specialized for over twenty years in modeling the dynamics of air flow.³³ Reynolds has been the primary analyst in more than 600 computer modeling projects worldwide.³⁴

Reynolds possesses expertise in Computational Fluid Dynamics (“CFD”).³⁵ CFD modeling is an advanced computer modeling technique used to analyze and predict in three dimensions air flow dynamics, air quality, temperatures, and dispersion of airborne chemicals or particulate matter through the air.³⁶ Reynolds has published over twenty articles and presented a combination of over fifty seminars, workshops, and graduate level classes relating to CFD modeling in the

³¹ *Id.* (internal quotations omitted).

³² Plaintiffs’ Response to AES’s *Daubert* Motion No. 9 to Exclude the Testimony of Mr. Scott D. Reynolds (“Pls.’ Resp.”) (Trans. ID. 57496578); Pls.’ Resp., Ex. A Reynolds Affidavit ¶ 1 (“Reynolds Aff.”).

³³ Reynolds Aff. ¶ 3.

³⁴ *Id.*

³⁵ *Id.* ¶ 2.

³⁶ Reynolds Expert Report at 4–8; Reynolds Aff. ¶¶ 10–11. The CFD modeling software packages are “computer based embodiments” of the laws of physics and chemistry that describe the motion of fluids, energy, and contaminant transport. Reynolds Aff. ¶ 10.

building industry.³⁷

At Plaintiffs' request, Reynolds created CFD models to track the dispersion and concentration of Coal Ash Waste and its toxic constituents from a dump site in Arroyo Barril.³⁸ Reynolds performed the analysis for two periods of time: (1) from January 2004 to March 2004, the time period the Waste was dumped at Arroyo Barril; and (2) from July 2006 to March 2008, the time period the Waste was removed from Arroyo Barril.³⁹ The purpose of this was to obtain a quantitative understating of certain peak exposures to Coal Ash Waste and its toxic constituents.⁴⁰

To perform CFD modeling, Reynolds had to create a "domain"—the size and dimensions of the area to be modeled.⁴¹ "Boundary conditions" are inputs that the user provides or calculates at the boundaries of the domain.⁴² A typical boundary condition is wind speed and direction, temperature, turbulence, topology, and the properties and particle size of the material being modeled.⁴³ Concentrations of airborne particulates were then calculated for two particles sizes

³⁷ See J.Ex. 11.A Reynolds Curriculum Vitae.

³⁸ Reynolds Expert Report at 3; Reynolds Aff. ¶¶ 5–6.

³⁹ Reynolds Aff. ¶ 7.

⁴⁰ Pls.' Resp. at 3.

⁴¹ Reynolds Expert Report at 4.

⁴² Reynolds Aff. ¶ 18, n.3.

⁴³ Reynolds Expert Report at 4; Reynolds Aff. ¶¶ 18–21. The boundary conditions for Reynolds' CFD models were selected based upon weather, climate and seasonal data from the specific areas around Arroyo Barril, the local area on or near the Samaná Peninsula, and from the island regional area in close proximity to the Dominican Republic. Reynolds Expert Report at 8.

and mapped within several kilometers of the dumpsite.⁴⁴

1. Material and Environment Modeled

Defendants argue that Reynolds' CFD models of Arroyo Barril are neither relevant nor reliable under *Daubert* because Reynolds modeled the incorrect material and an environment not representative of Arroyo Barril.⁴⁵ Defendants maintain that Reynolds incorrectly modeled emissions from "fly ash" rather than Coal Ash Waste.⁴⁶ According to Defendants, fly ash is a very fine ash with a low silt content and Coal Ash Waste is "a cured blend of hydrated fly and bottom ash that forms an aggregate consisting of much larger particles, up to the size of boulders."⁴⁷ Defendants further maintain that Reynolds modeled a "hypothetical" environment that is not representative of Arroyo Barril and, therefore, his models do not reliably reproduce conditions existing during the relevant time period in Arroyo Barril.⁴⁸ Specifically, Defendants assert Reynolds: (1) incorrectly modeled wind directions that are not representative of Arroyo Barril;⁴⁹ (2) incorrectly modeled a barren environment while Arroyo Barril is a heavily vegetated

⁴⁴ Reynolds Expert Report at 3.

⁴⁵ AES's *Daubert* Motion to Exclude the Testimony of Mr. Scott D. Reynolds at 9 ("Defs.' Mot. Exclude Reynolds") (Trans. ID. 57346402).

⁴⁶ *Id.* at 9–15; *see supra* note 6 (Defendants refer to Coal Ash Waste as "Manufactured Aggregate").

⁴⁷ Defs.' Mot. Exclude Reynolds at 10.

⁴⁸ *Id.* at 15.

⁴⁹ *Id.* at 15–22.

rainforest;⁵⁰ and (3) incorrectly modeled a completely dry environment.⁵¹

Defendants are challenging Reynolds’ underlying factual assumptions, not the reliability of CFD modeling generally or Reynolds’ qualifications and expertise in the field of CFD modeling. “[A]s a general rule, the factual basis of an expert opinion goes to the credibility of the testimony, not the admissibility, and it is for the opposing party to challenge the factual basis of the expert opinion on cross-examination.”⁵² However, “[u]nder D.R.E. 702, the trial judge must make a preliminary determination that the expert witness is able, as a factual matter, to provide the proposed opinion.”⁵³ Pursuant to D.R.E. 702(1), an expert’s opinion must be based upon “sufficient facts or data.”⁵⁴

Reynolds modeled a material and environment based on product composition information from AES Puerto Rico Material Safety Data Sheets, Reynolds’ personal observations in Arroyo Barril, historical satellite images, historical weather data, and eyewitness reports.⁵⁵ The Court finds that Reynolds’ CFD models concerning the material and environment are based upon sufficient

⁵⁰ *Id.* at 23–25.

⁵¹ *Id.* at 25–27.

⁵² *Perry v. Berkley*, 996 A.2d 1262, 1271 (Del. 2010).

⁵³ *Id.* at 1270.

⁵⁴ *Bell v. Fisher*, 2010 WL 3447694, at *4 (Del. Super. 2010); *Perry*, 996 A.2d at 1271 (“When the expert’s opinion is not based upon an understanding of the fundamental facts of the case, however, it can provide no assistance to the jury and such testimony must be excluded.”)

⁵⁵ Reynolds Aff. ¶¶ 16–17, 33, 44–45; Pls.’ Resp. at 6–17.

facts and data,⁵⁶ are the product of reliable principles and methods,⁵⁷ and Reynolds has applied those principles and methods reliably to the facts of this case. Defendants' challenge goes to credibility, not admissibility.

2. Heavy Metals and PAHs Concentration Levels and Dispersion

Next, Defendants argue that Reynolds' CFD models relating to heavy metal (arsenic, manganese, selenium, cadmium, lead, mercury, and nickel) concentrations and dispersion are inadmissible under *Daubert* because Reynolds relied on data concerning heavy metal concentrations in fly ash produced at other power plants instead of heavy metal concentration data from Coal Ash Waste actually produced at the AES Puerto Rico plant.⁵⁸

It is well settled that “[c]ourts may not substitute their own judgment for that of experts in the field as to what data an expert should rely upon in reaching an opinion.”⁵⁹ Reynolds explained that the first step in CFD modeling is considering whether there is sufficient information to develop a reliable retrospective exposure model.⁶⁰ Because Reynolds did not have data concerning the composition of the actual Coal Ash Waste dumped and later removed from Arroyo Barril, he

⁵⁶ *Compare Perry*, 996 A.2d at 1271 (“Dr. Eppley rendered an expert opinion based upon a *completely incorrect* case specific factual predicate.”).

⁵⁷ *See Reynolds Aff.* ¶¶ 12–14 (discussing CFD modeling as a generally accepted scientific method, CFD modeling peer review, and research relating to potential error rates of CFD modeling).

⁵⁸ Defs.’ Mot. Exclude Reynolds at 27–29.

⁵⁹ *Wilmington Hospitality, LLC v. New Castle Cnty.*, 2007 WL 1248513, at *7 (Del. Super. 2007).

⁶⁰ Reynolds Aff. ¶ 15.

considered whether the absence of such data would prevent him from formulating a reliable model.⁶¹ Relying upon his engineering expertise in CFD modeling, Reynolds determined that he possessed sufficient data to create reliable CFD models of Coal Ash Waste and its toxic constituents during the relevant time period in Arroyo Barril. Reynolds relied upon data from similar coal burning power plants, data concerning the typical proportions of fly ash to bottom ash from other coal burning power plants, and product composition information from AES Puerto Rico Material Safety Data Sheets.⁶² The Court finds that Reynolds' proffered opinion relating to heavy metal concentrations and dispersion is based upon sufficient facts and data, is the product of reliable principles and methods, and Reynolds has applied those principles and methods reliably to the facts of this case. Defendants' challenge goes to weight, not admissibility.

Defendants also argue that Reynolds' CFD models concerning the concentrations and dispersion of polycyclic aromatic hydrocarbons ("PAHs") are inadmissible under *Daubert*.⁶³ Reynolds relied on PAHs concentrations calculated by Plaintiffs' expert David A. Sullivan ("Sullivan").⁶⁴ After Reynolds submitted his expert report, Sullivan submitted a supplemental report with different PAHs

⁶¹ *Id.*

⁶² *Id.* ¶¶ 16–17.

⁶³ AES's Reply Brief in Support of *Daubert* Motion to Exclude the Testimony of Mr. Scott D. Reynolds at 19–20 (Trans. ID. 57607589).

⁶⁴ See J.Ex. 14.A David A. Sullivan Expert Report: Air Quality Analysis: Air Quality Meteorological Expert at 6-3–6-5.

concentration values.⁶⁵ Sullivan’s supplemental report explained that his first report incorrectly listed the units for modeled PAHs concentrations based on micrograms per cubic meters (which overstated the PAHs values) rather than the correct units, nanograms per cubic meter.⁶⁶ Defendants argue that because Reynolds relied on Sullivan’s incorrect PAHs concentration values, Reynolds’ opinion is not reliable or relevant.⁶⁷

In his affidavit, Reynolds states that the new PAHs values did not implicate his CFD modeling methodology and that, “it can be easily addressed by revising the factual inputs.”⁶⁸ As discussed above, however, the Court must make a foundational determination under D.R.E. 702(1) that the testimony is based upon sufficient facts or data and “[w]hen an expert bases an opinion on erroneous or incomplete information, the opinion is not based on ‘sufficient facts or data’ and must be excluded.”⁶⁹ Because Reynolds relied upon erroneous PAHs values, his proffered opinion concerning the concentrations and dispersion of PAHs is not based on sufficient facts or data and must be excluded.⁷⁰

⁶⁵ See J.Ex. 14.B Supplemental Report: Air Quality Analysis: Air Quality Meteorological Expert at 2–3.

⁶⁶ *Id.*

⁶⁷ Defs.’ Mot. Exclude Reynolds at 27–29.

⁶⁸ Reynolds Aff. ¶ 72.

⁶⁹ *Perry*, 996 A.2d at 1269.

⁷⁰ If Reynolds prepared a supplemental expert report based on the correct PAHs values, the Court is unable to find it in the record.

V. CONCLUSION

To the extent Reynolds relied on incorrect PAHs values to opine on the concentrations and dispersion of PAHs during the relevant time period in Arroyo Barril, Defendants' *Daubert* Motion to Exclude the Testimony of Mr. Scott D. Reynolds is **GRANTED**. With respect to the remainder of Reynolds' opinions, Defendants' *Daubert* Motion to Exclude the Testimony of Mr. Scott D. Reynolds is **DENIED**. The Court finds Reynolds is qualified by knowledge, skill, experience, training, and education to opine about the CFD models. The Court also finds Reynolds' opinions are relevant; based upon information reasonably relied upon by experts in the particular field; will assist the trier of fact to understand the evidence or to determine a fact in issue; and will not create unfair prejudice or confuse or mislead the jury. For the foregoing reasons, Defendants' *Daubert* Motion to Exclude the Testimony of Mr. Scott D. Reynolds is **GRANTED in part, and DENIED in part**.

IT IS SO ORDERED.

Jan R. Jurden, President Judge