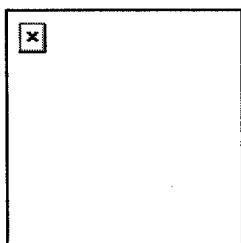
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Opinion issued July 26, 2007



**In The
Court of Appeals
For The
First District of Texas**

NO. 01-05-00132-CV

GEORGIA-PACIFIC CORPORATION, Appellant

V.

FRED STEPHENS AND BETTY STEPHENS, Appellees

**On Appeal from the 23rd District Court
Brazoria County, Texas
Trial Court Cause No. 22045-1 BH02**

OPINION

In this asbestos case, Georgia-Pacific Corporation seeks reversal of a judgment on a jury verdict against it and in favor of appellees, Fred and Betty Stephens. The Stephenses sued Georgia-Pacific and other defendants after Fred developed mesothelioma, alleging that he contracted the disease in part as a result of his exposure to Georgia-Pacific joint compound during the years he worked as a commercial painter. On appeal, Georgia-Pacific contends (1) the evidence is legally insufficient to support the jury finding of causation, (2) the trial court erred in excluding an affidavit from Fred detailing his exposure to asbestos gloves manufactured by codefendant Guard-Line, (3) the evidence is legally and factually insufficient to support the jury award of mental anguish damages, and (4) the evidence is legally insufficient to support the jury finding of malice. In a cross-issue, the Stephenses contend that the trial court erred in calculating prejudgment interest. Following the Texas Supreme Court's decision in *Borg-Warner Corporation v. Flores*, we conclude that the expert testimony presented in this case is legally insufficient to support the jury's causation finding. *See* No. 05-0189, 2007 WL 1650574, at *4-5 (Tex. June 8, 2007). We therefore reverse and render.

I. FACTS

For over thirty years, Fred was employed in occupations that exposed him to asbestos and asbestos-containing materials. Fred served in the Navy from 1944 to 1946. During his service, he was exposed to asbestos and asbestos-containing products, including boilers, pipe covering, insulation, gaskets, packing, and pumps. He subsequently worked for the Washington State Bureau of Reclamation on the Grand Coulee Dam, from 1946 to 1954, where he was further exposed to asbestos and asbestos-containing products, including turbines, generators, insulation, gaskets, and pumps.

After finishing work on the dam, Fred became a commercial painter. He worked for Finrow Painting from 1954 until 1977 and then started his own business, Stephens Painting. Fred painted various commercial buildings, including schools, universities, hospitals, paper mills, saw mills, grocery stores, and automobile dealerships. At each of these sites, he was responsible for painting the entirety of the building, including the exterior and interior walls, the boiler room and pipes, and any equipment located within the building. During these years, Fred was exposed to asbestos and asbestos containing products.

Some of the buildings Fred painted were new or were under renovation. Before Fred and his crew began to paint the interior walls in a new building or one under renovation, sheetrockers and tapers applied joint compound to connect adjoining pieces of sheetrock. The joint compound usually came in a powdered form that the workers mixed with water before applying it to the walls. Once the compound dried, the sheetrockers sanded it to smooth the walls in preparation for painting. The mixing and sanding processes created a great deal of dust, and Fred was often present in the room while the sheetrockers performed their tasks. Once the sheetrockers finished sanding, Fred swept the dust from the walls and floor and proceeded to paint. Occasionally, Fred mixed and sanded joint compound himself.

Bestwall Company manufactured the joint compound at issue in this case. Georgia-Pacific acquired Bestwall via merger in 1965. The Georgia-Pacific/Bestwall joint compound contained between two and eight percent chrysotile asbestos. Georgia-Pacific began manufacturing an asbestos-free joint compound in 1977. As discussed further below, Fred and his coworkers from Finrow Painting recalled seeing the Georgia-Pacific brand of joint compound, among other brands, at some of their job sites.

Asbestos exposure is a commonly recognized factor that increases the risk of developing mesothelioma, a form of lung cancer. In January 2003, doctors diagnosed Fred with a right pleural biphasic mesothelioma. He died of the disease shortly after this trial.

II. PROCEDURAL HISTORY

The Stephenses sued 106 named defendants and 100 John Doe defendants in Brazoria County, alleging, among other things, negligence, gross negligence, and strict liability. By the time of trial, the Stephenses, who reside in Washington State, had settled their claims with all but three defendants: Georgia-Pacific (a Georgia corporation), Kaiser-Gypsum (a Washington corporation), and Guard-Line (a Texas corporation). Kaiser-Gypsum settled after opening statements, leaving complete diversity of citizenship. Georgia-Pacific removed the case to federal court, alleging that Guard-Line, the Texas defendant, was fraudulently joined because the Stephenses had no evidence against it. *See* 28 U.S.C. § 1441(b) (2000) (prohibiting removal based on diversity jurisdiction when defendant is resident of forum state). Fred responded with an affidavit averring that he had breathed the dust from Guard-Line's asbestos gloves "repeatedly and continuously throughout [his] career as a painter which spanned over thirty years." After finding that Georgia-Pacific had failed to show fraudulent joinder, the federal court remanded the case back to state court.

When trial resumed, Georgia-Pacific moved to strike the Stephenses' experts, contending that their opinions were insufficiently reliable because they did not show that "Mr. Stephens' exposures to Georgia-Pacific's joint compound increased his risk of developing mesothelioma to at least twice the risk that he would have had otherwise if not exposed to Georgia-Pacific compound." After conducting a *Robinson* hearing, [2]

the trial court overruled Georgia-Pacific's motion and allowed the experts to testify.

At the close of the evidence, the court directed a verdict for Guard-Line. The court then submitted a jury charge inquiring about marketing defects and negligence as to the joint compound sold by Georgia-Pacific, together with the products of ten settling defendants. The jury found six of the eleven defendants, including Georgia-Pacific, liable for both a marketing defect and for negligence. It apportioned responsibility at twenty percent for Georgia-Pacific and sixteen percent for each of the other five liable settling defendants. The jury awarded Fred \$1.5 million for past and future physical pain and impairment and \$1 million for past and future mental anguish. It awarded Betty \$1 million for loss of consortium and household services. It also found that Georgia-Pacific acted with malice and awarded \$2.5 million in exemplary damages.

After making appropriate settlement credits and applying the punitive damages cap, the trial court signed a final judgment against Georgia-Pacific for \$1,903,878. This appeal followed.

III. CAUSATION ANALYSIS

Georgia-Pacific contends that the evidence is legally insufficient to support a finding of specific causation. Georgia-Pacific relies on the general rule that, in a products liability case, the plaintiff must prove that the defendant's product caused his injury. *See Gauding v. Celotex Corp.*, 772 S.W.2d 66, 68 (Tex. 1989). Georgia-Pacific notes that the Stephenses do not know—and did not prove—which asbestos product caused Fred's mesothelioma or contributed to an increased risk of his developing it; rather, they relied on expert testimony that any exposure to asbestos contributes to cause mesothelioma. Georgia-Pacific challenges this expert testimony on the ground that it does not comport with the requirements for expert testimony set forth by the Texas

Supreme Court in *Merrell Dow Pharmaceuticals, Inc. v. Havner*, and the general jurisprudence of the Texas Supreme Court that requires that exposure to a defendant's product be a "substantial factor" in causing a plaintiff's injury. *See* 953 S.W.2d 706, 717 (Tex. 1997).

A. Standard of Review

The test for legal sufficiency is "whether the evidence at trial would enable reasonable and fair-minded people to reach the verdict under review." *City of Keller v. Wilson*, 168 S.W.3d 802, 827 (Tex. 2005). In making this determination, we credit favorable evidence if a reasonable fact-finder could, and disregard contrary evidence unless a reasonable fact-finder could not. *Id.* So long as the evidence falls within the zone of reasonable disagreement, we may not substitute our judgment for that of the fact-finder. *Id.* at 822. The trier of fact is the sole judge of the credibility of the witnesses and the weight to give their testimony. *Id.* at 819. Although we consider the evidence in the light most favorable to the challenged findings, indulging every reasonable inference that supports them, we may not disregard evidence that allows only one inference. *Id.* at 822.

B. Specific Causation in an Asbestos Case

1. General versus Specific Causation

Causation in toxic tort cases is often discussed in terms of general and specific causation. *See Havner*, 953 S.W.2d at 714. "General causation is whether a substance is capable of causing a particular injury or condition in the general population, while specific causation is whether a substance caused a particular individual's injury." *Id.*

Georgia-Pacific does not mount a general causation challenge. That is, for the purposes of this appeal, Georgia-Pacific does not dispute that inhalation of chrysotile

asbestos fibers (the type of fibers found in Georgia-Pacific joint compound) can lead to the development of mesothelioma. Rather, Georgia-Pacific asserts that the Stephenses produced no evidence of specific causation. Georgia-Pacific asserts that “[t]he plaintiffs did not prove that Georgia-Pacific joint compound, or any comparable joint compound, caused mesothelioma in Mr. Stephens.”

2. *Competing Specific Causation Standards*

“A fundamental principle of traditional products liability law is that the plaintiff must prove that the defendants supplied the product which caused the injury.” *Gaulding*, 772 S.W.2d at 68. In *Gaulding*, the petitioners conceded that they were unable to identify the specific manufacturer of an asbestos-containing board that caused their mother’s mesothelioma. *Id.* at 67. Their father had purchased the board at a salvage yard and had converted it into a vanity cabinet for their mother. *Id.* Because the petitioners did not know who had manufactured the board, they sued five companies that allegedly “‘dominated the market of asbestos-containing wallboard’ at the time of [their mother]’s exposure.” *Id.* at 68. The Texas Supreme Court rejected each of the collective liability theories advanced by the petitioners, including the concert of action, enterprise, alternative, and market share liability theories. *Id.* at 68–71.

The Stephenses do not ask that we adopt any of the collective liability theories rejected by the Texas Supreme Court in *Gaulding*. Thus, the parties here agree that Texas law requires that a plaintiff must prove that the defendant’s product specifically caused his asbestos-related injury. The parties disagree about the way in which a plaintiff can prove specific causation in an asbestos case.

3. *Celotex Corp. v. Tate: The “Any Exposure” Test*

Until June 2007, the Texas Supreme Court had not considered specific causation

standards in an asbestos case since *Gaulding*, but a few of our sister courts had. In *Celotex Corp. v. Tate*, the Corpus Christi Court of Appeals recognized that an asbestos case in which the plaintiff alleges that the products of several defendants caused his injury presents a unique situation. 797 S.W.2d 197, 203–05 (Tex. App.—Corpus Christi 1990, writ dismissed by agreement). In *Tate*, the plaintiff knew which three defendants had supplied the raw asbestos to which he was exposed while working at a wallboard and plaster plant for nearly thirty years. *Id.* at 200, 204. Tate’s problem was that none of his medical experts could determine which particular exposure to asbestos dust had resulted in his mesothelioma. *Id.* at 204.

The *Tate* court devised the following causation rule for multi-defendant asbestos cases: “If there was sufficient evidence presented by appellees showing that [appellant] supplied *any* of the asbestos to which Tate was exposed, then appellees have adequately met their burden of proof.” *Id.* (emphasis in original). In other words, evidence of *any* exposure to a defendant’s product, no matter the amount, was legally sufficient evidence to support a causation finding. *Id.* This causation standard presumes harm from exposure to the product, with the burden of apportioning that harm then placed among the defendant manufacturers. *See id.* The Corpus Christi court reaffirmed the applicability of this asbestos causation principle in *Borg-Warner Corporation v. Flores*. *See* 153 S.W.3d 209, 213–14 (Tex. App.—Corpus Christi 2004), *rev’d*, 2007 WL 1650574, at *8. The Texarkana Court of Appeals also adopted the *Tate* rule. *See Fibreboard Corp. v. Pool*, 813 S.W.2d 658, 691–92 (Tex. App.—Texarkana 1991, writ denied).

4. Lohrmann: *The Frequency-Regularity-Proximity Test*

But not all courts agreed that “any exposure” sufficiently proved causation under

Texas law. One year after the Corpus Christi Court of Appeals issued the *Tate* decision, the United States Court of Appeals for the Fifth Circuit considered the asbestos causation issue. See *Slaughter v. S. Talc Co.*, 949 F.2d 167, 170 (5th Cir. 1991). In *Slaughter*, the court applied “the most frequently used test for causation in asbestos cases[:] the ‘frequency-regularity-proximity’ test,” first announced by the United States Court of Appeals for the Fourth Circuit in *Lohrmann v. Pittsburgh Corning Corp.*, as the appropriate causation test under Texas law. *Id.* at 171; see also *Lohrmann v. Pittsburgh Corning Corp.*, 782 F.2d 1156, 1162–63 (4th Cir. 1986). Under the frequency-regularity-proximity test, a plaintiff must prove that, “more probably than not, he actually breathed asbestos fibers originating in defendants’ products. This proof can be made by showing that plaintiff frequently and regularly worked in proximity to defendants’ products such that it is likely that plaintiffs inhaled defendants’ asbestos fibers.” *Slaughter*, 949 F.2d at 171.

The Dallas Court of Appeals considered the frequency-regularity-proximity test in *Keene Corp. v. Gardner*. See 837 S.W.2d 224, 227 (Tex. App.—Dallas 1992, writ denied). The court declined to expressly adopt the test because it found no case in which a Texas state court had applied the test. *Id.* The court nonetheless relied on it to find that appellees had produced some evidence of causation. *Id.* at 227–28.

Several years later, the Fourteenth Court of Appeals similarly considered the frequency-regularity-proximity test, in *Click v. Owens-Corning Fiberglass Corp.* See 899 S.W.2d 376, 378 (Tex. App.—Houston [14th Dist.] 1995, no writ). It noted that the Dallas Court of Appeals had “applied” the test, while specifically declining to “adopt” it. *Id.* The Fourteenth Court reversed a directed verdict because the evidence showed that Click had insulated pipes for an extended period of time; appellees’ products, which

contained asbestos, were used by his company for many years to insulate pipes; and appellees' products were seen near Click. *Id.* The court held that it was possible for a reasonable jury to conclude that Click more probably than not inhaled asbestos fibers from appellees' products, which led to his mesothelioma. *Id.* Hence, although our sister court did not expressly adopt the frequency-regularity-proximity test, it effectively applied the test in reaching its disposition. *Id.*

5. *Havner: Epidemiological Studies and Specific Causation Requirements*

Meanwhile, in toxic tort cases not involving asbestos, the Texas Supreme Court set forth guidelines for assessing the adequacy of exposure in *Merrell Dow Pharmaceuticals, Inc. v. Havner*. See 953 S.W.2d at 714–15. In *Havner*, the Texas Supreme Court held that, in cases in which no direct evidence of specific causation exists, plaintiffs may rely on studies showing an increased risk of their particular injury resulting from exposure to the substance at issue to raise a fact question on causation. *Id.* Specifically, the court held:

In the absence of direct, scientifically reliable proof of causation, claimants may attempt to demonstrate that exposure to the substance at issue increases the risk of their particular injury [by relying on epidemiological studies]. The finder of fact is asked to infer that because the risk is demonstrably greater in the general population due to exposure to the substance, the claimant's injury was more likely than not caused by that substance. Such a theory concedes that science cannot tell us what caused a particular plaintiff's injury. It is based on a policy determination that when the incidence of a disease or injury is sufficiently elevated due to exposure to a substance, someone who was exposed to that substance and exhibits the disease or injury can raise a fact question on causation.

Id. at 715.

Use of an increased risk to prove causation comes with an important caveat: when a plaintiff relies on epidemiological studies to prove specific causation, he must show

that he is “similar” to the individuals in the study. *Id.* at 720. This includes:

proof that the injured person was exposed to the same substance, that the exposure or dose levels were comparable to or greater than those in the studies, that the exposure occurred before the onset of injury, and that the timing of the onset of injury was consistent with that experienced by those in the study. Further, if there are other plausible causes of the injury or condition that could be negated, the plaintiff must offer evidence excluding those causes with reasonable certainty.

Id. (citation omitted); *see also Coastal Tankships, U.S.A., Inc. v. Anderson*, 87 S.W.3d 591, 602 n.21 (Tex. App.—Houston [1st Dist.] 2002, pet. denied) (“The supreme court recognizes that it is possible that a toxic-tort plaintiff may not be able to find reliable direct evidence of specific causation. A plaintiff in such a situation may be able to prove specific causation circumstantially by taking general-causation evidence, such as epidemiological studies, and showing he is similar to the studies’ subjects.” (citation omitted)).

Thus, in the years since *Gaulding*, Texas courts developed different tests for specific causation—each an effort to strike an appropriate balance between the competing concerns in an asbestos case—namely, on the one hand, the difficulties encountered by plaintiffs with asbestos-related diseases, who were exposed to multiple asbestos-containing products, in proving which products caused their injury, and, on the other, “the concept deeply imbedded in our jurisprudence that a defendant cannot be found liable for an injury unless the preponderance of the evidence supports cause in fact.” *Havner*, 953 S.W.2d at 718; *see also Jackson v. Anchor Packing Co.*, 994 F.2d 1295, 1301 (8th Cir. 1993) (“Courts across this country have struggled with the appropriate quantum of proof that asbestos plaintiffs should be required to produce in order to submit the issue of causation to a jury. The courts have recognized that, given the nature of asbestos exposure in large industrial settings and the long latency periods

for asbestos-related diseases, plaintiffs (especially bystanders) face a formidable task in showing, after many intervening years, exposure to a particular defendant's asbestos product and that exposure's causation of the plaintiff's injuries. On the other hand, the courts have also recognized the countervailing interest that states and defendants have in retaining the longstanding requirement of proximate cause in tort law." (citations [3] omitted)).

6. *The Texas Supreme Court Settles the Issue: Borg-Warner v. Flores*

It is within this framework that the Texas Supreme Court decided *Borg-Warner*, rejecting the "any exposure" test for specific causation and adopting a *Lohrmann/Havner* substantial-factor causation standard. *See* 2007 WL 1650574, at *4–5.

The asbestos containing product in *Borg-Warner* was brake pads. *Id.* at *1. Flores was a retired brake mechanic who developed asbestosis. *Id.* During his thirty-five year career, Flores used Borg-Warner brake pads on five to seven of the roughly twenty brake jobs he performed per week. *Id.* The Borg-Warner brake pads contained seven to twenty-eight percent asbestos fibers. *Id.* Grinding the brake pads generated clouds of dust that Flores inhaled while working in an eight by ten-foot room. *Id.*

Flores's experts opined that Borg-Warner brake pads caused Flores's asbestosis due to the asbestos dust he inhaled while grinding the brake pads. *Id.* First, Flores's pulmonologist noted that Flores's lungs showed scarring associated with asbestos fibers. *Id.* Second, Flores's expert as to exposure level noted that research involving the brake industry showed that "levels of exposure [to asbestos fibers] . . . could be significant," and pointed to OSHA studies and warnings regarding increased levels of asbestos exposure among brake mechanics. *Id.* at *2. Yet, Flores's experts conceded that "everyone is exposed to asbestos in the ambient air" and that they did not research Borg-

Warner's brake pads in particular to determine whether grinding them resulted in an increased risk of exposure to asbestos. *Id.* at *1–2. The jury found for Flores, apportioning thirty-seven percent of the liability for his asbestos-related injury to Borg-Warner. *Id.* at *3. The Corpus Christi Court of Appeals, applying the “any exposure” test announced in *Tate*, affirmed. *Id.*

The Texas Supreme Court reversed and rendered, concluding that Flores's expert testimony was legally insufficient proof of substantial-factor causation. *Id.* at *8. First, the Texas Supreme Court adopted the *Lohrmann* “frequency, regularity, proximity” standard but noted that, at its inception, the *Lohrmann* court's analysis went further than this tripartite test: the essence of *Lohrmann* is that the exposure must “be a ‘substantial factor’ in causing the disease.” *Id.* at *4. Thus, a plaintiff must not only show that he was exposed to the asbestos-containing product on a regular basis, but also that such exposure was in sufficient amounts so as to increase his risk of developing an asbestos-related disease. *Id.* at *4–5. As the court observed, toxicologists agree that it is the dose of a potentially toxic substance that makes it poison. *Id.* at *5. As asbestosis is a dose-responsive disease, “so that the more one is exposed, the more likely the disease is to occur,” the record must contain evidence as to the quantity of respirable asbestos for the jury to evaluate. *Id.* Relying on its *Havner* decision, the court reaffirmed the principle that “epidemiological studies are without evidentiary significance if the injured person cannot show that ‘the exposure or dose levels were comparable to or greater than those in the studies.’” *Id.* (quoting *Havner*, 953 S.W.2d at 720–21).

The court thus concluded that the *Lohrmann* frequency-regularity-proximity test is necessary to prove causation, but alone is not sufficient. *Id.* at *4–5. To prove substantial-factor causation, a plaintiff must show both frequent, regular, and proximate

exposure to the product *and* reasonable quantitative evidence that such exposure increased the risk of developing the asbestos-related injury. *Id.* at *4–7. It is not adequate to simply establish that “some” exposure occurred. *Id.* at *8.

B. Application of the *Borg-Warner* Specific Causation Analysis

With the principles set forth in *Borg-Warner* in mind, we turn now to an analysis of the lay and expert testimony that the Stephenses presented at trial regarding the Georgia-Pacific joint compound as a cause of Fred’s mesothelioma.

1. The Lay Testimony

We first clarify the relevant timeframe for our analysis. Georgia-Pacific began manufacturing an asbestos-free joint compound in 1977. Thus, the relevant timeframe for our analysis is 1965, the year Georgia-Pacific acquired Bestwall, through 1977, the year Fred stopped working as a painter, and Georgia-Pacific removed all asbestos from its joint compound.

Fred testified live at trial and through a videotaped deposition played for the jury. During his deposition, Fred initially testified that he did not think he had personally worked with any Georgia-Pacific products, and that the only Georgia-Pacific product he ever worked around was sheetrock. Unlike Georgia-Pacific joint compound, Georgia-Pacific sheetrock did not contain asbestos. Later in the deposition, however, Fred clarified that he personally used Georgia-Pacific joint compound during the 1960s and 1970s: “Well, I have used that [Georgia-Pacific joint compound] quite a bit on jobs. In fact, I’ve gone into some small jobs and done the taping [applying joint compound] myself in a room. . . . I never was classified as a taper myself, but I’ve done quite a bit of taping.” He also testified that after other workers applied and sanded Georgia-Pacific joint compound, he and his crew cleaned up by sweeping the dust off the floor with a

broom, which “put dust up into the air where you could see it.” Moreover, during his live trial testimony, Fred responded in the affirmative to counsel’s question, “[D]o you remember seeing Georgia-Pacific joint compound on a substantial number of jobs you worked on?”

Several of Fred’s coworkers also testified regarding Fred’s exposure to joint compound. Roger Lenius testified by videotaped deposition that he worked with Fred from 1968 until 1977. He stated that fifty to seventy-five percent of their job duties involved painting new construction and being around sheetrock work. When asked which joint compound products he observed during those years, he testified as follows: “Kaiser Gypsum. There was a Best Wall or Better Wall. I think later they were using—it was Georgia-Pacific. And then there was Flintkote and Gold Bond, but—these were some of the ones that seemed to be used more prevalently than others.” When asked whether he noticed any particular brand more than another, he responded that “the jobs that seemed to have more of the particular products would be Kaiser Gypsum and Gold Bond. I noticed a lot of those. Flintkote was a fair amount”

Lenius testified that he and Fred were often in the same room, probably twenty to thirty feet away from the workers who mixed the dry joint compound with water. He testified that the mixing process was dusty, as was the sanding process: “When they sand a wall, of course, there’s a big cloud of dust and a lot of times it drifts. . . . And then, of course, it falls to the ground, lays on the wall. So there’s . . . quite a bit of dust everywhere.” Lenius stated that he and Fred were “generally pretty close” to the sanders because they painted “right behind” them. When they spray painted, they stood a maximum of six feet away from the wall, and the pressure from the spray paint would reintroduce the asbestos dust into the air—in fact, it would “raise clouds of dust.”

Lenius stated that he and Fred did “a little bit of taping but not very much. Very little.”

Mack Stephens, Fred’s brother, worked with Fred at Finrow Painting from 1964 until 1977. He testified via videotape that twenty percent of their jobs involved painting pipes, one-third involved painting the outside of buildings, fifteen to twenty percent involved painting concrete walls, twenty percent involved painting equipment, and the remainder (seven to twelve percent) involved painting interior walls. He further testified that seventy percent of those jobs involved sheetrock work. He recalled the following brands of joint compound at their job sites: Georgia-Pacific Ready-mix, Georgia-Pacific dry powder, Flintkote patching, Kelly Moore patching, and Bestwall. Mack did not personally observe Fred using any Georgia-Pacific dry powder product.

Mack testified that he and Fred were often in the same room with the workers who mixed and sanded the joint compound. Both of these processes caused dust to fly everywhere. Before Fred and his crew could paint, Fred cleaned the floor by sweeping the dust with a broom. It would be “so dusty you couldn’t hardly see the room.” Mack also testified that, although it was not a regular part of their job to do sheetrock patch work, he observed Fred personally apply and sand joint compound while at Finrow. He recalled seeing Fred sand the joint compound more than once, but could not recall how often.

Michael Stephens, Fred’s son, worked at Finrow Painting during the summers of 1968 through 1970, full-time starting in 1971 until the end of 1972, and then again from 1975 until 1977. During the summers of 1964 through 1968, Michael visited Fred at job sites a couple of times each week for a few hours. Michael recalled seeing the following joint compounds at job sites: “I can remember Bestwall, I can remember Flintkote.

Those two, I can remember them in the dry. I can remember Georgia-Pacific, I can remember Paco. There's some others I can remember, like Durabond, USB. Those are the ones I can remember." Michael testified that his father personally used Bestwall joint compound at a Safeway job site. Specifically, Fred mixed, applied, and sanded the Bestwall compound and breathed the resulting dust. Bestwall was the product that the crew carried in their vehicle, so they used it for patch work at other job sites, as well.

Michael also testified that Fred and his crew were often in the same areas where sheetrock work was being done. They were around the workers who mixed and sanded the joint compound, and there would be dust in the air and on their persons from these processes. Fred cleaned the dust with a broom before spray painting. Both the cleaning and painting processes were dusty, as well.

2. *The Expert Testimony*

The Stephenses called Jerry Lauderdale, an industrial hygienist, Samuel Hammar, M.D., a pathologist, and Alice Boylan, M.D., a board-certified specialist in pulmonary disease, internal medicine, and critical care, as expert witnesses on the causation issue. Lauderdale opined, "with respect to Georgia-Pacific joint compounds . . . [Fred's] exposures were at a level and of the type that are known by industrial hygienists to contribute to the development of asbestos-related disease." He based his opinion on a review of the deposition testimony of the lay witnesses, Fred's medical records, and literature relating to asbestos exposure. The literature upon which Lauderdale relied, as discussed in greater detail below, detected asbestos fibers in excess of OSHA's permissible exposure limits during joint compound mixing and sanding operations. Lauderdale thus concluded, "it is possible to say . . . that [Fred] would have from time to time been exposed to concentrations above permissible exposure limits"

Lauderdale conceded, however, that he could not “come up with a range of likely doses that Mr. Stephens would have had to joint compound asbestos.” With respect to estimating dosage, Lauderdale testified, “It is my opinion that in a scientific sense, I don’t believe that it can be done due to the fact there is not enough information about [Fred’s] exposures; and it would be involving more guesswork than science to come up with estimates or guesses for those type of numbers.” Nor could Lauderdale estimate the amount of time Fred was exposed to joint compound generated asbestos dust in excess of OSHA permissible levels.

Lauderdale did not testify as to the minimum level of exposure to asbestos dust from joint compound that could lead to an increased risk of mesothelioma. Instead, he observed that “asbestos-related diseases are based on cumulative exposures and there is no way to separate out what exposure, in fact, causes development of the disease.” It was Lauderdale’s opinion “that every exposure does contribute to the development of—potential to develop mesothelioma.”

Dr. Hammar opined that chrysotile asbestos, the kind found in the Georgia-Pacific joint compound, “cause[s] dose-related asbestos disease, which means that you can see cases of all types caused by chrysotile asbestos at different doses in different individuals.” He further opined that the level of exposure it takes to cause mesothelioma “could be any level above what is considered to be background, which, from my definition, would be anything greater than .1 fiber cc years.” In sum, he stated: “I’m going to express an opinion that each and every exposure that an individual has in a bystander occupational setting causes their mesothelioma.” Like Lauderdale, Dr. Hammar relied upon various studies concerning asbestos exposure and asbestos-related disease as the foundation for his opinion. Dr. Hammar also testified that mesothelioma

is a dose-responsive disease, and that a threshold exists “above which you may be at risk, below which you may not be at risk” for developing the disease.

Dr. Boylan testified that Fred’s mesothelioma developed as a result of asbestos exposure, but had no information about the particular asbestos-containing products to which Fred was exposed. She did not express an opinion “as to which of those specific products . . . actually caused his disease.” Dr. Boylan testified that people who live in a normal urban environment will have asbestos fibers in their lungs as a result of breathing asbestos in the air. In her opinion, mesothelioma, like other asbestos diseases, is a dose-responsive disease—the lower one’s exposure to asbestos, the less likely one is to develop mesothelioma. She could not offer an opinion as to the level of exposure that would be low enough such that the exposure could not be considered a cause of mesothelioma in an individual. Similar to Dr. Hammar, Dr. Boylan observed that “our understanding of the development of cancer as it stands today is that all exposures to a carcinogen contribute to the development of a malignancy, and you can’t say just one because it isn’t just a one-hit injury that will cause cancer. You have to have multiple genetic alterations to lead to a malignant cell, so I would say all [exposures] do.”

Georgia-Pacific objected that the literature relied upon by Lauderdale and Hammar does not support an “any exposure” link between Georgia Pacific’s asbestos-containing joint compound and mesothelioma. Thus, we examine the literature presented in connection with this trial. [5]

a. Quantitative Evidence of Increased Risk

The Stephenses’ experts relied on numerous studies showing that chrysotile asbestos is capable of causing mesothelioma generally, thus providing some evidence of general causation. For example, Dr. Hammar cited one study that concluded as follows:

In contrast to amphibole forms of asbestos, chrysotile asbestos is often claimed to be only a minor cause of malignant pleural mesothelioma Reported data[, however,] do[es] not support widely quoted views regarding the relative inertness of chrysotile fibers in mesothelioma causation. In fact, examination of all pertinent studies makes it clear that chrysotile asbestos is similar in potency to amphibole asbestos. Since asbestos is the major cause of mesothelioma, and chrysotile constitutes 95% of all asbestos use world wide, it can be concluded that chrysotile asbestos is the main cause of pleural mesothelioma in humans.

In another study, Dr. Yasunosuke Suzuki examined the lung and mesothelial tissues of 151 individuals diagnosed with mesothelioma and found that in sixty-eight percent of the cases, the mesothelial tissue contained only chrysotile fibers—that is, there was a complete absence of amphibole fibers. This observation led Dr. Suzuki to conclude that “chrysotile fibers [a]re capable of inducing human malignant mesothelioma.” Georgia-Pacific did not call any expert witnesses, or rely on any studies reaching the opposite conclusion.

To support their claim of specific causation, the Stephenses’ experts relied on four studies addressing occupational exposure to joint compound among tapers and sheetrock workers. Three of these studies measured the average levels of airborne asbestos fibers from joint compound products to which sheetrock workers are exposed on a daily basis. For example, one study found that the mean asbestos fiber concentration during pole sanding, which typically consumes ten to fifteen percent of a worker’s day, was ten [6] fibers per cubic centimeter. The same study found that a worker standing eight feet away from the individual doing the pole sanding would be exposed to 8.6 fibers per cubic centimeter on average, while a worker standing twenty-five feet away would be exposed to 4.8 fibers per cubic centimeter. The study also found that a worker mixing dry joint compound, which typically takes sixty to ninety seconds, would be exposed to

47.2 fibers per cubic centimeter on average. Someone standing ten to twenty feet away would be exposed to 5.8 fibers per cubic centimeter, while someone standing sixteen to thirty-five feet away would be exposed to 2.6 fibers per cubic centimeter. Finally, the study found that, fifteen minutes after a worker finished sweeping dust from joint compound off the floor, he would be exposed to 41.4 fibers per cubic centimeter on average. The average exposure decreased to 26.4 fibers per cubic centimeter thirty-five minutes after sweeping. The study authors noted that many of these exposures exceeded the then-existing OSHA “threshold limit value” of five fibers per cubic centimeter. [7]

A second study found similar, but generally lower, mean asbestos fiber concentrations. For instance, it found that a worker mixing dry joint compound would be exposed to 11.2 fibers per cubic centimeter on average. An individual pole sanding would be exposed to 4.6 fibers per cubic centimeter, while an individual hand sanding would be exposed to 11.5 fibers per cubic centimeter. A worker sweeping would be exposed to 19.6 fibers per cubic centimeter. The third study reached similar conclusions. These three exposure studies, however, dealt solely with potential exposures during the mixing and sanding processes—they did not attempt to correlate the exposures to any incidence of mesothelioma or asbestos-related disease among the study subjects.

While the fourth study investigates mesothelioma among workers exposed to asbestos, the authors did not measure exposure levels—rather, they undertook a mortality analysis involving 12,873 deceased members of the Operative Plasterers’ and Cement Masons’ International Association, a union composed of plasterers, cement masons, and shophands. The study described plasterers’ job duties as follows:

Plasterers, in general, are responsible for all interior and exterior plastering

[8]
of drywall, cement, stucco, and stone imitation as well as the taping and pointing of all joints, nail holes and bruises on wallboard or drywall. Plasterers are also responsible for the preparation, installation, and repair of all interior and exterior insulation systems, and the fireproofing of steel beams and columns. Approximately 10% of the plasterers' duties involve insulation work

The study thus noted that plasterers are exposed to asbestos from a variety of sources, including spray insulation, plastering, taping, asbestos removal during demolition projects, and fireproofing mixture. Plasterers comprised about one-third of the study population.

The authors conducted a proportionate mortality ratio ("PMR") analysis by comparing the number of deaths in the study population attributable to a certain disease with the number of deaths expected from that disease. For example, there were 1,157 observed deaths from diseases of the respiratory system generally, compared with 1,155 expected deaths, leading to a PMR of 100. For asbestosis specifically, there were fifteen observed deaths, compared with only two expected, leading to a PMR of 693.

With respect to mesothelioma, the study concluded as follows: "Mesothelioma, a relatively rare cancer death, was observed for four members and the risk was elevated, PMR=188, but not statistically significant." The authors later explained, however, that mesothelioma is frequently misdiagnosed. Consequently, the authors "manually reviewed all hard copy death certificates in [thei]r possession (N=9,449) to obtain a more accurate assessment of mesothelioma-related deaths in this cohort. [They] identified 40 mesothelioma deaths; even though only one-third of [the] cohort were plasterers, 50% of those who died of mesothelioma worked in this trade."

The study's ultimate conclusion is that the PMR for mesothelioma resulting from the cohort's exposure to a variety of asbestos-containing products is 188 (which we

assume is synonymous with a relative risk of 1.88),^[9] but the study authors observed that such an increase is not statistically significant.^[10] And, although the study authors manually reviewed 9,449 death certificates and identified thirty-six additional cases of mesothelioma, they did not calculate a new PMR (i.e., relative risk) using this revised data or discuss its statistical significance.^[11] They noted, however, that “deaths [due to mesothelioma] are considered to be quite rare in the general population.”

b. Evidence of Frequent-Regular-Proximate Contact

The Stephenses’ expert witnesses were unable to estimate Fred’s exposure to Georgia-Pacific joint compound. For example, Jerry Lauderdale, the Stephenses’ industrial hygiene expert, testified that Fred “was exposed to joint compounds, including Georgia-Pacific, on numerous occasions. As far as how much, I can’t give you a quantitative estimate of how much he was exposed to. . . . It’s not scientifically possible to come up with a meaningful estimate of what that was.” In fact, he conceded that “it would be a guess rather than a scientific exercise” to determine “how many times [Fred] was actually exposed to joint compound.”

Fred and his crew painted interior walls about seven to twelve percent of the time, and other workers were doing sheetrock work on about fifty to seventy-five percent of these jobs. They worked in close proximity to the sheetrock workers, who mixed and sanded joint compound, both of which were dusty processes. Before Fred and his crew could paint, they had to sweep dust off the floor. Moreover, the spray painting process itself stirred up asbestos dust. The record does not reveal, however, how frequently this dust came from Georgia-Pacific’s joint compound, as opposed to one of the other joint compound products Fred’s coworkers recalled seeing on their job sites. Fred’s

coworkers recalled seeing ten different joint compound products: Kaiser Gypsum, Bestwall, Flintkote, Gold Bond, Georgia-Pacific Ready-mix, Georgia-Pacific dry powder, Kelly Moore patching, Paco, Durabond, and USB. Lenius testified that Kaiser Gypsum, Gold Bond, and Flintkote were used most frequently.

In this record, there is no evidence concerning the percentage of Georgia-Pacific joint compound used in comparison to the quantity of other products used on Fred's job sites, nor any quantitative estimate of the number of times Georgia-Pacific joint compound was used on Fred's job sites. On the other hand, there is evidence that three other joint compounds were used more frequently than Georgia-Pacific's product. Thus, although there was evidence that Fred was exposed to asbestos-containing joint compound generally, there was no quantitative evidence presented upon which Fred's experts could rely to determine that he was exposed to Georgia-Pacific's product in sufficient quantities to have increased his risk of developing mesothelioma. *See Borg-Warner*, 2007 WL 1650574, at *6 (“[A]bsent any evidence of dose, the jury could not evaluate the quantity of respirable asbestos to which Flores might have been exposed or whether those amounts were sufficient to cause asbestosis. Nor did Flores introduce evidence regarding what percentage of that indeterminate amount may have originated in Borg-Warner products.”).

Other courts that have considered similar factual scenarios have reached the same conclusion. For example, the Eastland Court of Appeals recently decided a case in which a brake worker had inhaled asbestos dust from installing the brake products of six different manufacturers. *Vaughn v. Ford Motor Co.*, 91 S.W.3d 387, 393 (Tex. App.—Eastland 2002, pet. denied). When Vaughn was asked whether he had used the various products equally, one more than another, or one less than another, he replied that he did

not know. *Id.* The court, applying Illinois law regarding the frequency-regularity-proximity test, concluded that, “[a]lthough there was evidence from which a jury could have found that Vaughn’s exposure to asbestos-containing brake products was a cause of his [mesothelioma] and evidence that each exposure contributed to his disease, there was no evidence from which a jury could have found that Vaughn was frequently exposed to any particular defendant’s brake product.” *Id.* at 392, 394.

Likewise, the United States Court of Appeals for the Eighth Circuit decided a case in which several witnesses testified that they had either seen or installed Owens-Corning Kaylo insulation at a tire plant. *See Jackson*, 994 F.2d at 1304. The evidence indicated that numerous other insulation products were also in use at the plant. *See id.* at 1299. The court found that the plaintiffs had failed to meet the frequency-regularity-proximity test, stating as follows:

With respect to the bystander plaintiffs, we find that the evidence . . . is insufficient to support a jury finding that Owens-Corning’s products were more likely than not a proximate cause of the plaintiffs’ injuries. The plaintiffs’ witnesses have not stated how much Kaylo insulation was used at the Mohawk plant, how often it was used, and where in the plant it was used. They have not given an estimate as to the amount of Kaylo used in relation to the other insulation products installed in the plant. They have, therefore, failed to show the frequency and regularity of the use of Kaylo insulation.

Id. at 1305.

Other products at issue in the case were gaskets and packing materials manufactured by a company called Chesterton. *Id.* at 1307. With respect to a particular plaintiff’s frequency and regularity of exposure, the Eighth Circuit observed as follows:

Carr testified that he had worked with gaskets and packing “many times” during his years as a mechanic. Thus, it appears at first glance that Carr has satisfied the “frequency, regularity and proximity” test. Carr’s case has a missing link, however. Although Carr said that he had used gaskets and packing many times, the record contains no evidence that he used

Chesterton gaskets and packing many times. We have no way of knowing whether Carr selected Chesterton products for two jobs or two hundred jobs.

Id. at 1308; compare *Robertson v. Allied Signal, Inc.*, 914 F.2d 360, 378 (3d Cir. 1990) (frequency-regularity-proximity test not met where, although several witnesses were able to place defendant's asbestos-containing product in plant, no witness was able to say how much of product was used and how many times it was used in given area), and *Lohrmann*, 782 F.2d at 1163 (exposure to asbestos-containing pipe covering on ten to fifteen occasions of between one and eight hours duration insufficient to satisfy frequency-regularity-proximity test), with *Rotondo v. Keene Corp.*, 956 F.2d 436, 442 (3d Cir. 1992) (frequency-regularity-proximity test met where evidence showed that plaintiff worked in boiler room at least two days per week for at least three to four months, and pipecoverers used defendant's asbestos-containing product in boiler room fifty percent of time), and *Goss v. Am. Cyanamid, Co.*, 650 A.2d 1001, 1006 (N.J. Super. Ct. App. Div. 1994) (frequency-regularity-proximity test met where plaintiff testified that "most" asbestos pipe covering he used was manufactured by defendant, and coworker testified that he used defendant's pipe covering approximately ninety percent of time and installed it in areas where plaintiff regularly worked). *But cf. Owens-Corning Fiberglas Corp. v. Garrett*, 682 A.2d 1143, 1156-57 (Md. 1996) (holding that frequency-regularity-proximity test was satisfied by coworkers' general testimony that they used variety of asbestos-containing products at plant, including defendant's product, and their testimony was corroborated by invoices showing purchase of defendant's product).

3. *Legal Sufficiency of the Evidence Presented*

Borg-Warner requires that, for a plaintiff to prove specific causation by relying on epidemiological studies showing an increased risk of developing mesothelioma, he must

show that the frequency and regularity of his exposure to the asbestos-containing product is comparable to or greater than that of the individuals in the studies upon which he relies. *See* 2007 WL 1650574, at *5. As discussed above, the evidence of Fred's exposure to Georgia-Pacific's joint compound is legally problematic because it lacks the quantitative element that *Lohrmann* and *Borg-Warner* require. *See id.* at *6. Without quantifying Fred's exposure to Georgia-Pacific joint compound, the Stephensens' experts inferred causation by opining that every exposure to an asbestos-containing product "contributes to cause" mesothelioma. That is, the experts posited that all asbestos fibers cause mesothelioma because all asbestos fibers have the ability to cause cancer-inducing mutations in cells and it is not possible to pinpoint which particular fibers actually caused the mutations. Dr. Hammar summarized the theory as follows: "I think you would have to say that . . . any exposure that [Fred] had to asbestos from when he first started working up until, say, 1986, is causative of his mesothelioma."

The Stephensens' experts failed to show, however, that the "any exposure" theory is generally accepted in the scientific community—that *any* exposure to a product that contains asbestos results in a statistically significant increase in the risk of developing mesothelioma. Each of the experts acknowledged at trial that mesothelioma, like asbestosis, is dose responsive—some non de minimus occupational exposure must occur to increase one's risk of developing the disease. Although the lay testimony presented at trial is sufficient to show that Fred worked in close proximity to asbestos-containing joint compound generally, it is legally insufficient to show that Fred frequently and regularly worked in close proximity to *Georgia-Pacific* joint compound so as to be exposed to enough of its asbestos to increase his risk of developing mesothelioma. The record does not contain any quantitative estimate of Fred's exposure to Georgia-

Pacific's joint compound, as the Stephenses' experts conceded.^[12] Moreover, although the literature and scientific studies the Stephenses' experts relied upon support a reasonable inference that exposure to chrysotile asbestos can increase a worker's risk of developing mesothelioma, none of the studies undertake the task of linking the minimum exposure level (or dosage) of joint compound with a statistically increased risk of developing of the disease. The experts in this case, which was tried before the *Borg-Warner* decision, instead relied upon the "any exposure" theory of causation that the Texas Supreme Court has rejected.^[13] Without quantitative evidence of exposure and any scientific evidence of the minimum exposure level leading to an increased risk of development of mesothelioma, we hold that the opinions offered by the Stephenses' experts in this case lack the factual and scientific foundation required by *Borg-Warner* and thus are legally insufficient to support the jury's causation finding.

IV. CONCLUSION

Applying the Texas Supreme Court's test in *Borg-Warner* for specific causation in asbestos cases, we conclude that the expert testimony regarding causation presented at trial is legally insufficient proof of substantial-factor causation necessary to support the jury's negligence and strict liability marketing defect verdicts against Georgia-Pacific. We therefore reverse and render.

Jane Bland
Justice

Panel consists of Justices Alcala, Hanks, and Bland.

[2]

See *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 558 (Tex. 1995).

[3]

We note that courts in every circuit but the D.C., First, and Second, as well as courts in several states, including Arkansas, Illinois, Maryland, Massachusetts, Michigan, Mississippi, Nebraska, New Jersey, Oklahoma, Pennsylvania, and Washington, have adopted the frequency-regularity-proximity test.

[4]

Lauderdale relied on the literature admitted as plaintiffs' exhibits 43, 566-68, and 635-38. Georgia-Pacific objected to the introduction of the literature, contending among other grounds that none of it linked asbestos-containing joint compound with mesothelioma. The trial court overruled the objections and admitted the literature into evidence.

[5]

The Stephenses also called Dr. Barry Castleman, who testified in *Borg-Warner* as an expert as to "what is in the public domain in medical literature." See *Borg-Warner Corp. v. Flores*, No. 05-0189, 2007 WL 1650574, at *2 (Tex. June 8, 2007). Dr. Castleman did not testify in this case about causation. He stated, however, that at the time of trial, there had not been studies done to determine whether a link exists between exposure to joint compound and mesothelioma.

[6]

Pole sanding involves the use of a five-foot pole with a steel plate to which a piece of sandpaper is attached.

[7]

Jerry Lauderdale, the Stephenses' industrial hygiene expert, testified in detail about OSHA's threshold limit values ("TLVs") for asbestos exposure. He explained that OSHA implemented both a "time-weighted average" TLV and a "short-term exposure" TLV. The time-weighted average TLV takes into account a worker's asbestos exposure over the course of an entire eight-hour work day, whereas the short-term exposure TLV measures the number of asbestos fibers to which a worker is exposed when undertaking a single activity (e.g., mixing or pole sanding), even though that activity might last only a few minutes. In 1971, OSHA imposed a time-weighted average TLV of twelve fibers per cubic centimeter. A year later, it reduced the time-weighted average TLV to five fibers per cubic centimeter and imposed a new short-term exposure TLV of ten fibers per cubic centimeter. In 1976, OSHA further reduced the time-weighted average TLV to two fibers per cubic centimeter, but retained the short-term exposure TLV of ten fibers per cubic centimeter. Ten years later, OSHA reduced the overall TLV to 0.2 fibers per cubic centimeter, and then to 0.1 fibers per cubic centimeter in 1994.

[8]

"Taping" refers to the application of joint compound.

[9]

None of the Stephenses' experts discussed the mortality study in detail, and no one explained how PMR relates to relative risk. After reviewing the study, however, it is our understanding that PMR and relative risk are synonymous.

[10]

The relative risk value is important because the *Havner* court held that "there is a rational basis for relating the requirement that there be more than a 'doubling of the risk' [i.e., a relative risk of 2.0] to our no evidence standard of review and to the more likely than not burden of

proof.” 953 S.W.2d 706, 717 (Tex. 1997). Although the court expressly refused to decide whether “epidemiological studies with relative risks of less than 2.0 might suffice if there were other evidence of causation,” it rejected many of the Havners’ studies on the grounds that the relative risk did not exceed 2.0 and/or the results were not statistically significant. *See, e.g., id.* at 719, 725 (“One study . . . had a relative risk of 1.18 and a confidence interval of 0.65 to 2.13. However, the relative risk would need to exceed 2.0, and the confidence interval could not include 1.0, for the results to indicate more than a doubling of the risk and a statistically significant association between Bendectin and limb reduction birth defects.”).

[11]

The *Havner* court rejected similar “data reanalysis” that did not identify a significance level or confidence interval. *See, e.g., id.* at 726 (“There is no explanation [in the data reanalysis] . . . of the significance level used to obtain the 2.8 [relative risk] result. The result may well be statistically inconclusive at a 95% confidence level. We simply do not know from this record. Without knowing the significance level or the confidence interval, there is no scientifically reliable basis for saying that the 2.8 result is an indication of anything.”).

[12]

Fred answered affirmatively at trial that Georgia-Pacific joint compound was used on a “substantial” number of jobs. But, as Lauderdale conceded, none of the lay witnesses attempted to provide a quantitative estimate regarding usage of Georgia-Pacific joint compound.

[13]

This is not to suggest that the levels of exposure evidenced in this case could never be proved to increase the risk of developing mesothelioma. In *Borg-Warner*, the supreme court notes a treatise that links mesothelioma with “low levels of asbestos exposure.” 2007 WL 1650574, at *5. Here, however, the experts and studies upon which they relied did not attempt to correlate low exposures with increased risk, but used instead an “any exposure” test. If “any exposure” leads to an increased risk of mesothelioma, then the testimony in this case proved that Fred was sufficiently exposed. The studies admitted in this trial record, however, do not link “any exposure” to asbestos with an increase in the risk of developing mesothelioma.