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**CONTROL SOLUTIONS, INC., UNITED PHOSPHORUS, INC., AND MARK
BOYD, Appellants v. GHARDA USA, INC. AND GHARDA CHEMICALS, LTD.,
Appellees**

NO. 01-10-00719-CV

COURT OF APPEALS OF TEXAS, FIRST DISTRICT, HOUSTON

*2012 Tex. App. LEXIS 6793***August 16, 2012, Opinion Issued**

SUBSEQUENT HISTORY: Released for Publication January 17, 2013.

Rehearing denied by, Reconsideration denied by, En banc *Control Solutions, Inc.*, 2012 Tex. App. LEXIS 10882 (Tex. App. Houston 1st Dist., Nov. 29, 2012) Petition for review filed by, 03/15/2013

PRIOR HISTORY: [*1]

On Appeal from the 55th District Court, Harris County, Texas. Trial Court Case No. 2004-67993. *Control Solutions, Inc. v. Gharda Chems., Ltd.*, 245 S.W.3d 550, 2007 Tex. App. LEXIS 7446 (Tex. App. Houston 1st Dist., 2007)

COUNSEL: For APPELLANT: Karen K. Milhollin, Westmorland Hall, P.C., Houston, TX; Jeffrey E. Fahys, George Howard Lugin, Westmoreland Hall Maines & Lugin, P.C., Houston, TX.

For APPELLEE: Charles W. Lyman, John B. Wallace, Hartline Dacus Barger Dreyer LLP, Houston, TX; John P. Abbey, Spagnoletti & Co., Houston, TX; Scott Patterson, Barker, Lyman, Twining, Weinberg & Ferrell, P.C., Houston, TX.

JUDGES: Panel consists of Justices Keyes, Higley, and Massengale. Justice Massengale, dissenting.

OPINION BY: Evelyn V. Keyes

OPINION

Appellants, Control Solutions, Inc., United Phosphorous, Inc. ("UPI"), and Mark Boyd (collectively, "CSI"),¹

appeal from the trial court's judgment notwithstanding the verdict ("JNOV") that they take nothing by their claims against appellees, Gharda Chemicals, Ltd. ("Gharda") and Gharda USA, Inc. ("GUSA"). In four issues, CSI argues that the trial court erred in (1) granting JNOV on the ground of unreliable expert testimony based solely on CSI's experts' failure to test chemical properties and characteristics; (2) granting JNOV on the jury's findings and award against GUSA for a marketing defect when the elements [*2] of that claim were not encompassed within the unreliable expert testimony on manufacturing defect and causation; (3) granting JNOV on CSI's negligence claim because legally and factually sufficient evidence supports the verdict without the expert testimony found unreliable by the trial court; and (4) granting summary judgment on limitations grounds against building owner Mark Boyd. Gharda and GUSA filed cross-points, arguing that: (1) if we reverse the JNOV, the proper disposition of the case is to remand the case to the trial court; (2) the evidence of damages is legally and factually insufficient; and (3) in the case of GUSA, the amount of its damages is limited by *Texas Business and Commerce Code section 2.719(a)(1)* to the amount CSI paid for the product.

1 CSI also named "their subrogated insurers," Hiscox, PLC and Amlin, PLC as additional appellants. CSI argues that the suit was actually brought by the insurers under their right to subrogation. See *Mid-Continent Ins. Co. v. Liberty Mut. Ins. Co.*, 236 S.W.3d 765, 774 (Tex. 2007) (holding that contractual subrogation is created by policy language in which insurer, in exchange for payment of loss, receives insured's rights against third [*3] party who was primarily liable

for payment and that equitable subrogation "arises in every instance in which one person, not acting voluntarily, has paid a debt for which another was primarily liable and which in equity should have been paid by the latter"). However, nothing in the pleadings or evidence admitted at trial indicates the type or extent of subrogation that might be applicable here. *See id.* at 774-75. These entities were not included in CSI's pleadings, nor were they parties to the trial court's final judgment; therefore, they are not proper parties on appeal. *See Cont'l Cas. Co. v. Huizar*, 740 S.W.2d 429, 430 (Tex. 1987); *Johnson v. Johnson*, 841 S.W.2d 114, 115 (Tex. App.--Houston [14th Dist.] 1992, no writ) (holding that, generally, only parties to action have standing to appeal).

We overrule Gharda and GUSA's cross-points on appeal, and we reverse and remand for the trial court to enter judgment in favor of CSI on the jury verdict.

BACKGROUND

A. Summary

This case arose out of a fire that destroyed CSI's chemical manufacturing operation and warehouse in Harris County, Texas in 2004. CSI alleged and argued at trial that Gharda and GUSA sold "off-spec" chemicals that were the [*4] cause of the fire. Following a jury verdict in favor of CSI, the trial court granted a take-nothing JNOV in favor of Gharda and GUSA. This appeal followed.

B. Relationship of Parties

CSI is a Texas company that makes insecticides and pesticides. Mark Boyd is the president of CSI, and he is the owner of the warehouse in Pasadena where CSI does its chemical manufacturing. The lease between Boyd and CSI requires CSI to obtain insurance covering all property owned by CSI and Boyd. The policy identifies "Control Solutions Inc. doing business as CJ Martin Co. and/or Gamat, Inc., Mark Boyd, Individual," as the insured. CSI claims that the underwriters paid \$3,163,185.50 for covered damage.

In its chemical production, CSI uses a generic chemical produced by Gharda and sold in the United States by GUSA called chlorpyrifos technical ("chlorpyrifos"). Gharda makes three grades of chlorpyrifos: a 99% pure grade sold in the U.S., a 98% pure grade sold in Europe, and a 94% pure grade sold to rest of world. At the time leading up to the trial, it sold approximately 500 tons of chlorpyrifos per month. CSI had been purchasing chlorpyrifos from Gharda since approximately 2001.

On March 8, 2004, a CSI employee [*5] placed thirty-two drums containing the solid chemical chlorpyrifos into a "hot box" in CSI's warehouse for melting. Each drum had been sealed at Gharda's plant in India, and the seals remained intact until the CSI employee moved the drums into the hot box. The next morning, on March 9, 2004, CSI distribution manager Robert Blair arrived at work at 5:00 a.m. He was working in the distribution building when he heard a "boom" followed approximately thirty seconds later by the fire alarm. CSI's chemical production facility was destroyed by the resulting fire. The fire also destroyed some of the products of another company, UPI, which stored materials in CSI's buildings.

C. Suit Filed/Pre-Trial Procedural History

In December 2004, CSI filed suit against Gharda and GUSA for products liability, breach of express warranty, breach of implied warranty of merchantability, and negligence.² UPI subsequently intervened in this suit.

2 CSI claims in its brief that the insurance "underwriters filed this lawsuit in subrogation in the name of CSI, because it had the contractual obligation to carry the insurance. CSI also sued for its uninsured damages, as did United Phosphorus, Inc." However, the original [*6] petition does not mention the insurance companies, and UPI did not intervene until later. CSI's original petition also named the manufacturer and distributor of the hot box as defendants, but they were subsequently dropped from the suit.

Among the many pre-trial filings, on August 12, 2009, Gharda and GUSA moved for summary judgment on damages, arguing, among other things, that CSI did not have the capacity to recover damages for the real property actually owned by Boyd. CSI responded to this motion on the merits. CSI also filed an amended petition adding Boyd as a named plaintiff as the owner/lessor of the facility. Gharda subsequently moved to strike Boyd as a plaintiff based on limitations and moved for summary judgment as to all of Boyd's claims. On November 10, 2009, the trial court denied the motion to strike "without prejudice to the Defendants of reconsideration after verdict" and further stated, "because the Court finds Defendants' motions for summary judgment are conditioned upon the Court striking the intervention of Mark Boyd, the merits of those motions are not reached at this time."

Gharda also moved pre-trial to exclude CSI's expert witnesses. The trial court conducted [*7] *Daubert/Robinson* hearings on the admissibility of the expert testimony on May 5, 2009.³ Several experts testified at the hearing, including Sammy Russo, CSI's fire-origin expert; Andy Armstrong, a forensic chemist and

chemical fire expert; Nicholas Cheremisinoff, a chemist; and Shannon Rusnak, a forensic accountant and CSI's damages expert. The trial court denied Gharda's motions to exclude the testimony of these experts.⁴

³ See *Daubert v. Merrell Dow Pharms.*, 509 U.S. 579, 590, 113 S. Ct. 2786, 2795, 125 L. Ed. 2d 469 (1993); *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 554 (Tex. 1995).

⁴ Gharda also challenged the admissibility of William Green's testimony. He testified at the *Daubert/Robinson* hearing, and his testimony was found reliable by the trial court. He did not testify at trial, and, therefore, his testimony is not challenged on appeal.

D. Trial to a Jury

The trial lasted for approximately two weeks and included testimony from twenty-two witnesses, many of them expert witnesses, and at least eleven volumes of exhibits. Gharda and GUSA renewed their objections to CSI's expert witnesses at trial, and the trial court overruled those objections.

Robert Blair, the CSI employee who was [*8] present when the fire first broke out, stated that he heard a sound like a truck crashing into the building, and, about forty-five seconds later, he heard the fire alarms go off and saw smoke billowing out of vents on the west side of the building. Firefighters responded. They reported that the building was locked and they had to force their way inside. When they entered the northwest quadrant of the building, they observed evidence of the fire to their right, which was the southwest quadrant of building where the hot box was located. Furthermore, firemen indicated that they did not open the hot box doors in the course of fighting the fire.⁵

⁵ Gharda points out that not all of the firefighters were interviewed. The only firefighter to testify at trial was Jerry Gardner, who was the chief of the Pasadena Fire Department at the time of the fire and served as the incident commander. Gardner testified about his own direct knowledge of the fire and the reports he received from other firefighters during the course of the fire.

Sammy Russo, CSI's fire-origin expert witness, investigated the fire. He opined that the fire began in the hot box containing chlorpyrifos and spread to the rest of the [*9] facility. Other experts, including Armstrong, a forensic chemist and chemical fire expert, and Cheremisinoff, a chemist, testifying on behalf of CSI, opined that the fire was caused by ignitable vapors produced during the chlorpyrifos's rapid decomposition and

that the rapid decomposition was caused by a contaminant in the chlorpyrifos.

Gharda presented expert testimony from Lloyd Hawkins, a certified fire investigator, opining that the fire did not start in or near the hot box, but rather, it started in the northwest quadrant of the warehouse. It also presented expert witnesses Wayne Britton and John Cayais, expert chemists, who tested chlorpyrifos to determine its flammability and who tested the retained samples ("retains") from the batches of chlorpyrifos sold to CSI and found that there was no contamination.

Shannon Rusnak, a forensic accountant and expert on damages, Mark Boyd, and others presented evidence of CSI's damages as a result of the fire.

The jury reached the following conclusions:

o Question One: "Did the negligence, if any, of those named below proximately cause the occurrence in question?" The jury was instructed on the meaning of negligence, ordinary care, and proximate [*10] cause, and it answered "no" as to CSI and "yes" as to both GUSA and Gharda.

o Question Two: "Was there a manufacturing defect in the Chlorpyrifos Technical at the time it left the possession of [Gharda] that was a producing cause of the occurrence in question?" The jury answered "yes."

o Question Three: "Did [GUSA] exercise substantial control over the content of the warning or instruction that accompanied the Chlorpyrifos Technical sold to [CSI]?" The jury answered "yes."

o Question Four: "Was the warning or instruction inadequate?" The jury was instructed on what constitutes "adequate" warnings, and it answered "yes."

o Question Five: "Did the plaintiffs' damages, if any, result from the inadequacy of the warning or instruction?" The jury answered "yes."

o Questions Six and Seven: "Did [GUSA] make an express factual representation to [CSI] about a material aspect of the Chlorpyrifos Technical?" The jury answered "yes," but it also found, in Question Seven, that the factual representation was not materially incorrect.

o Questions Ten and Eleven: "Was there a defect in the marketing of the Chlorpyrifos Technical at the time it left the possession of [Gharda] that was a producing cause of [*11] the occurrence in question?" The jury was instructed on the meaning of "marketing defect," "adequate" warnings, "unreasonably dangerous" products, and "producing cause." The jury answered "no." The jury also responded "no" to the same question asked about GUSA.

o Question Twelve: "For each company you found caused or contributed to cause the occurrence, find the percentages of responsibility attributable to each" The jury found that CSI had 0% responsibility, that GUSA had 10% responsibility, and that Gharda had 90% responsibility.

o Questions Thirteen, Fourteen, and Fifteen: The jury found that GUSA and CSI had "an agreement to sell Chlorpyrifos Technical that met product specifications and was free of contaminants," that GUSA failed to comply with its agreement with CSI, and that GUSA's breach of its agreement was not a proximate cause of CSI's injuries.

o Question Sixteen: Regarding damages, the jury found, for Boyd, that "[t]he reasonable costs in Harris County, Texas to restore the building in question to the condition it was in immediately before the occurrence in question" was \$1.9 million; for UPI, that "the difference in the market value in Harris County, Texas, of [UPI's] [*12] contents of the warehouse immediately before and immediately after the occurrence" was \$1 million; for CSI, the jury found that the "difference in the market value . . . of [CSI's] contents of the warehouse immediately before and immediately after the occurrence" was \$2.3 million, that the difference in the market value of the contents of the office building was \$100,000, that the "reasonable and necessary costs for environmental cleanup costs as a result of the occurrence" were \$2.1 million, that the "reasonable costs . . . for bulk tank repairs and cleanup costs" were \$20,000, that the "[r]easonable and necessary extra production costs" were \$950,000, and that lost profits amounted to \$0.

The jury returned its verdict on February 25, 2010.

E. Post-Trial Motions and Final Judgment

On March 2, 2010, the trial court, on its own motion, ordered that all parties attend post-verdict mediation with David Mathiesen within thirty days. Also on March 2, 2010, the trial court granted "the Defendant's Motion for Summary Judgment as to All Claims of Mark Boyd." This motion was originally filed by Gharda and GUSA pre-trial, on September 2, 2009.

On [*13] April 6, 2010, CSI moved for judgment on the verdict.

On April 9, 2010, Gharda filed its "Response Opposing Motion for Entry of Judgment." Gharda argued that it was entitled to JNOV and that CSI had erroneously included Mark Boyd in its proposed judgment because (1) the trial court's March 2, 2010 summary judgment had eliminated the award to Mark Boyd and "Interested Insurers"; (2) CSI had "hidden what amounts of money the insurers paid to each separate Plaintiff and why and when those payments were made"; and (3) the insurers had never proved that they had paid any claims, and the motion for entry of judgment offered no proof of that fact either, in that the attached copies of a Lloyd's insurance policy and three proofs of loss were not admitted as evidence at trial. This motion asked that the trial court deny CSI's motion for entry of judgment and grant Gharda JNOV, or, alternatively, if the court entered judgment for CSI, that the court not enter judgment for Boyd or the "Interested Insurers" because the court had granted summary judgment on all of Boyd's claims.

Also on April 9, 2010, Gharda moved for JNOV. In this motion, Gharda argued that the "Plaintiffs cannot make a case based [*14] on speculation," that the Plaintiffs had "essentially tried the case as a res ipsa case even though CSI, not Defendants, controlled the drums," and that, "[i]n fact, the Court properly denied Plaintiffs a res ipsa instruction." Gharda argued that the jurors could not infer contamination of the product without competent evidence of contamination and that "although a jury could have chosen to disbelieve Gharda's testimony about what the retains [samples retained by Gharda from the batch of chlorpyrifos at issue here] showed, the jury had no competent affirmative testimony on which to conclude that the [chlorpyrifos] was defective when it left Gharda's control." Gharda argued that there was no competent evidence to support the jury's answer to Question One on negligence and proximate cause because Cheremisinoff's testimony was incompetent. Gharda argued that he did not testify in terms of reasonable probability (rather, he stated "reasonable possibility") and that

"his testimony was conclusory and speculative, his testimony was unreliable under *Daubert* standards, and his testimony reasoned backwards from a desired result."

Gharda also argued that there was no competent evidence to support [*15] the jury's answer to Question Two, that a manufacturing defect was a producing cause of the fire. It argued that the expert testimony on this subject was conclusory, speculative, and unreliable under *Daubert*.

Finally, Gharda argued that there was no competent evidence to support the jury's answer to Question Sixteen regarding damages.

On April 23, 2010, CSI filed a motion for leave to amend its petition. It alleged that the parties and the trial court had agreed that subrogation rights involving the interested insurers would be addressed and calculated post-trial. It further argued that the parties had treated the issue as if it had been pleaded, and, therefore, it was tried by consent.

CSI also filed an amended motion for judgment on the verdict. In this motion, it addressed Boyd's claims, arguing that the trial court had erred in dismissing his claims on limitations grounds, and it again argued that the interested insurers had a contractual right of subrogation to the jury awards in favor of CSI and Boyd.

On April 29, 2010, Gharda filed a response opposing CSI's motion for leave to amend its petition, arguing that the "insurers failed to appear or prove up their damages" and that "there [*16] was no agreement to do so post-verdict." Also on April 29, 2010, Gharda filed a supplement to its motion for JNOV. This supplement argued that CSI "failed to disclose trial witnesses and had no good cause for their [sic] failure."

Finally, Gharda also responded to CSI's amended motion for entry of judgment, arguing that the trial court had correctly granted summary judgment on Boyd's claims and that CSI's alternative judgment gave it \$1.5 million more than the jury awarded. GUSA filed a joinder in these motions.

On May 14, 2010, CSI responded to the motion for JNOV. It also argued that GUSA's motion to join Gharda's motion was not sufficient for the trial court to grant JNOV in favor of GUSA because the two companies "stand in different shoes."

On May 20, 2010, the trial court signed the following orders: (1) an order denying CSI's motion for leave to amend its petition; (2) an order denying CSI's motion for reconsideration of the trial court's order granting Gharda's motion to dismiss all claims of Mark Boyd; (3) an order denying Gharda's motion for JNOV, including

the supplement; and (4) an order denying GUSA's motion for JNOV and supplement.

Also on May 20, 2010, the trial court signed [*17] a final judgment awarding CSI \$4,923,000 from Gharda and \$547,000 from GUSA, awarding UPI \$900,000 from Gharda and \$100,000 from GUSA, and ordering that Boyd take nothing against Gharda and GUSA.⁶

6 The record does not provide a source for the damages amounts assessed here by the trial court. These amounts do not correspond to the jury award or to the motion to enter judgment on the verdict.

On June 9, 2010, Gharda filed its "First Amended Motion for Judgment Notwithstanding the Verdict." This motion again argued that CSI "cannot make a case based on speculation," that CSI "essentially tried this case as a res ipsa case," and that there was no competent evidence supporting the jury's answers to Questions One, Two, and Sixteen. Gharda also argued that CSI "failed to disclose trial witnesses and had not good cause for their [sic] failure."

Also on June 9, 2010, Gharda moved for a new trial based on "the jury's prejudice" and on its arguments that CSI "cannot make a case based on speculation," that there was factually insufficient evidence to support the jury's answers to Questions One, Two, and Sixteen, and that CSI had failed to disclose trial witnesses, specifically arguing that CSI "should [*18] not have been allowed to call any witnesses based on their [sic] failure to timely and properly list them" in response to Gharda's timely, pretrial interrogatory and that CSI had no good cause for this failure. Gharda further argued that CSI failed to provide the actual address for Jerry Gardner, the former chief of the Pasadena Fire Department, even though it knew his address. On June 17, 2010, GUSA joined Gharda's amended motion for JNOV, and it filed its own motion for new trial.

On July 8, 2010, CSI responded to these motions.

On August 10, 2010, the trial court denied Gharda's and GUSA's motions for new trial.

Also on August 10, 2010, the trial court entered its "Amended Final Judgment." This judgment stated that the trial court "finds [CSI's] expert testimony is unreliable and constitutes no evidence of negligence, manufacturing defect and causation and, therefore, cannot support the jury's answers to jury questions one and two. As a result, the court disregards the jury's answers to questions one and two, and finds for Defendants Gharda USA, Inc. and Gharda Chemicals, Ltd. and grants, in part, Defendant's Motion for Judgment Notwithstanding the Verdict." It vacated its May 20, [*19] 2010 judgment and order

denying Gharda's motion for JNOV and ordered that "all Plaintiffs take nothing against" Gharda and GUSA and that all of the plaintiffs' claims were dismissed with prejudice.

JURISDICTION

As a threshold matter, we address the trial court's jurisdiction to enter JNOV in this case.

CSI argues that the trial court granted JNOV *sua sponte* and thereby violated *Texas Rule of Civil Procedure 301*, which provides:

The judgment of the court shall conform to the pleadings, the nature of the case proved and the verdict, if any, and shall be so framed as to give the party all the relief to which he may be entitled either in law or equity. Provided, that upon motion and reasonable notice the court may render judgment non obstante veredicto if a directed verdict would have been proper, and provided further that the court may, upon like motion and notice, disregard any jury finding on a question that has no support in the evidence. Only one final judgment shall be rendered in any cause except where it is otherwise specially provided by law. Judgment may, in a proper case, be given for or against one or more of several plaintiffs, and for or against one or more of several defendants [*20] or intervenors.

TEX. R. CIV. P. 301.

In making this argument, CSI misrepresents the record. Gharda and GUSA both moved for JNOV, and they both filed amended JNOV motions along with their motions for new trial following the trial court's original May 20, 2010 judgment. Any motions for new trial or motions to reconsider or modify this judgment had to be filed within thirty days, or by June 21, 2010. *TEX. R. CIV. P. 329b(a)*. Gharda filed its amended motion for JNOV and a separate motion for new trial on June 9, 2010, and GUSA joined Gharda's motion for JNOV and filed its own motion for new trial on June 17, 2010. These timely motions extended the court's plenary power seventy-five days, to August 3, 2010, at which time all of these motions were overruled by operation of law. *TEX. R. CIV. P. 329b(c)*. However, *Texas Rule of Civil Procedure 329b(e)* provides that when a timely motion for new trial is filed, the trial court has plenary power to grant a new trial or to vacate, modify, correct, or reform the judgment until thirty days after all such timely-filed motions are

overruled, either by a written and signed order or by operation of law, whichever occurs first. *TEX. R. CIV. P. 329b(e)*. [*21] Thus, the trial court had plenary power to vacate the original judgment up until September 2, 2010, and the August 10, 2010 judgment vacating the May 20, 2010 judgment was entered within the trial court's plenary power.

We conclude that the trial court had jurisdiction to act as it did. We therefore address the merits of the appeal.

JNOV

In its first, second, and third issues, CSI challenges the trial court's JNOV.

A. Standard of Review

A trial court may grant a motion for JNOV if a directed verdict would have been proper, and it may disregard any jury finding on a question that has no support in the evidence. *TEX. R. CIV. P. 301*. A trial court may disregard a jury finding and render JNOV if the finding is immaterial or if there is no evidence to support one or more of the findings on issues necessary to liability. *Tiller v. McLure*, 121 S.W.3d 709, 713 (Tex. 2003); *Spencer v. Eagle Star Ins. Co. of Am.*, 876 S.W.2d 154, 157 (Tex. 1994). A question is immaterial, for the purpose of determining whether a court may disregard a jury finding, when the question should not have been submitted or when it was properly submitted but has been rendered immaterial by other findings. *Spencer*, 876 S.W.2d at 157.

A [*22] trial court properly enters a directed verdict (1) when a defect in the opposing party's pleadings makes them insufficient to support a judgment; (2) when the evidence conclusively proves a fact that establishes a party's right to judgment as a matter of law; or (3) when the evidence offered on a cause of action is insufficient to raise an issue of fact. *M.N. Dannenbaum, Inc. v. Brummerhop*, 840 S.W.2d 624, 629 (Tex. App.--Houston [14th Dist.] 1992, writ denied). In such a case, the issue should not be submitted to the jury. *See id.*

In reviewing the rendition of JNOV, the reviewing court must determine whether there is any evidence upon which the jury could have made the finding. *Tiller*, 121 S.W.3d at 713; *see also B & W Supply, Inc. v. Beckman*, 305 S.W.3d 10, 15 (Tex. App.--Houston [1st Dist.] 2009, pet. denied) (holding that we review JNOV's under no-evidence standard). The reviewing court must view the evidence in the light most favorable to the verdict, crediting favorable evidence if reasonable jurors could and disregarding contrary evidence unless reasonable jurors could not. *City of Keller v. Wilson*, 168 S.W.3d 802, 822 (Tex. 2005); *see Tiller*, 121 S.W.3d at 713 (holding that,

in [*23] reviewing "no evidence" point, court views evidence in light that tends to support finding of disputed fact and disregards all evidence and inferences to contrary); *Bradford v. Vento*, 48 S.W.3d 749, 754 (Tex. 2001).

To sustain a challenge to the legal sufficiency of the evidence to support a jury finding, the reviewing court must find that (1) there is a complete lack of evidence of a vital fact; (2) the court is barred by rules of evidence from giving weight to the only evidence offered to prove a vital fact; (3) there is no more than a mere scintilla of evidence to prove a vital fact; or (4) the evidence conclusively established the opposite of a vital fact. *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 903 (Tex. 2004).

If some evidence supports the disregarded finding, the reviewing court must reverse the JNOV and render judgment on the verdict unless the appellee asserts cross-points showing grounds for a new trial. *M.N. Dannenbaum, Inc.*, 840 S.W.2d at 628; *Basin Operating Co. v. Valley Steel Prods. Co.*, 620 S.W.2d 773, 776 (Tex. Civ. App.--Dallas 1981, writ ref'd n.r.e.); see also *Beckman*, 305 S.W.3d at 15-16 (holding that we must uphold jury's verdict and not trial court's [*24] judgment if more than scintilla of evidence supports jury's finding). However, JNOV is proper when the trial court is barred by the rules of evidence from giving weight to the only evidence offered to prove a vital fact. *Volkswagen of Am., Inc.*, 159 S.W.3d at 903; see also *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 638 (Tex. 2009) (holding that party may assert on appeal that scientific evidence or expert testimony is unreliable and therefore legally insufficient to support verdict); *Coastal Transp. Co., Inc. v. Crown Cent. Petroleum Corp.*, 136 S.W.3d 227, 234-35 (Tex. 2004) (holding that expert witness testimony on gross negligence claim was legally insufficient and rendering judgment that plaintiff take nothing).

B. Reliability of Expert Testimony

In its first issue, CSI argues that the trial court erred in disregarding the jury's answers to Questions One, Two and Sixteen and entering JNOV on the issues of negligence, product defect, and causation. In its motion for JNOV, Gharda argued that there was no competent evidence to support the jury's answer to Question One on negligence and proximate cause, because the testimony of CSI's expert, Cheremisnoff, was incompetent and unreliable; [*25] Gharda also argued that there was no competent evidence to support the jury's answer to Question Two, that a manufacturing defect was a producing cause of the fire because the expert testimony on this subject was conclusory, speculative, and unreliable under *Daubert*; and it argued that, consequently, there was no competent evidence to support the jury's answer to Question Sixteen, regarding damages.

In determining whether the trial court's rendition of JNOV was proper, we must first determine whether the trial testimony of CSI's experts was unreliable and therefore constituted no evidence. The admission of expert testimony is governed by *Texas Rule of Evidence 702*, which 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.

TEX. R. EVID. 702; E.I. du Pont de Nemours & Co. v. Robinson, 923 S.W.2d 549, 554 (Tex. 1995). "Expert testimony is admissible if (1) the expert is qualified, and (2) the testimony is relevant and based on a reliable [*26] foundation." *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 800 (Tex. 2006) (citing *Helena Chem. Co. v. Wilkins*, 47 S.W.3d 486, 499 (Tex. 2001) and *Robinson*, 923 S.W.2d at 556).

"In deciding whether an expert is qualified, the trial court must 'ensur[e] that those who purport to be experts truly have expertise concerning the actual subject about which they are offering an opinion.'" *Mendez*, 204 S.W.3d at 800 (quoting *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 719 (Tex. 1998)).

Scientific testimony must be based on a reliable underlying scientific technique or principle. *Robinson*, 923 S.W.2d at 557. "Scientific testimony is unreliable if it is not grounded 'in the methods and procedures of science,' and amounts to no more than a 'subjective belief or unsupported speculation.'" *Mendez*, 204 S.W.3d at 800 (quoting *Robinson*, 923 S.W.2d at 557). Expert testimony may also be unreliable if "there is simply too great an analytical gap between the data and the opinion proffered." *Id.* (quoting *Gammill*, 972 S.W.2d at 727). "A flaw in the expert's reasoning from the data may render reliance on a study unreasonable and render the inferences drawn therefrom dubious. Under that circumstance, [*27] the expert's scientific testimony is unreliable and, legally, no evidence." *Id.* at 801 (quoting *Merrell Dow Pharm., Inc. v. Havner*, 953 S.W.2d 706, 714 (Tex. 1997)).

"Rule 702 envisions a flexible inquiry focusing solely on the underlying principles and methodology, not on the conclusions they generate." *Robinson*, 923 S.W.2d at 557 (citing *Daubert*, 509 U.S. at 593-94, 113 S. Ct. at 2797); see also *Allison v. Fire Ins. Exch.*, 98 S.W.3d 227, 238 (Tex. App.--Austin 2002, pet. granted, judgment vacated w.r.m.) ("A trial court must focus solely on the

validity of principles and methodology underlying the testimony, not the conclusions generated.") (internal quotations omitted).

The Texas Supreme Court has identified six non-exclusive factors that trial courts may consider in determining whether expert testimony is reliable:

- (1) the extent to which the theory has been or can be tested;
- (2) the extent to which the technique relies upon the subjective interpretation of the expert;
- (3) whether the theory has been subjected to peer review and/or publication;
- (4) the technique's potential rate of error;
- (5) whether the underlying theory or technique has been generally accepted as valid by the relevant [*28] scientific community; and
- (6) the non-judicial uses which have been made of the theory or technique.

Mendez, 204 S.W.3d at 801 (citing *Robinson*, 923 S.W.2d at 557).

The supreme court has emphasized, however, that these factors are not exclusive and that they do not fit every scenario. *TXI Transp. Co. v. Hughes*, 306 S.W.3d 230, 235 (Tex. 2010) (citing *Gammill*, 972 S.W.2d at 726); see also *Ford Motor Co. v. Ledesma*, 242 S.W.3d 32, 39 (Tex. 2007) (holding that *Robinson* factors are particularly hard to apply in vehicular-accident cases involving accident reconstruction testimony). Thus, the supreme court has determined that, "[r]ather than focus[ing] entirely on the reliability of the underlying technique used to generate the challenged opinion, as in *Robinson*," it is appropriate in some cases "to analyze whether the expert's opinion actually fits the facts of the case." *Hughes*, 306 S.W.3d at 235 (citing *Volkswagen of Am., Inc.*, 159 S.W.3d at 904-05). "In other words, we determine whether there are any significant analytical gaps in the expert's opinion that undermine its reliability." *Id.*

Generally, rulings on objections as to the admissibility of evidence, including whether expert testimony [*29] is reliable, are reviewed for an abuse of discretion. *Whirlpool Corp.*, 298 S.W.3d at 638. However, in a no-evidence review, we independently consider whether the evidence at trial would enable reasonable and fair-minded jurors to reach the verdict. *Id.* "[A] no-evidence review encompasses the entire record, including contrary

evidence tending to show the expert opinion is incompetent or unreliable." *Id.*

In *Robinson*, the supreme court held that it is not the trial court's role "to determine the truth or falsity of the expert's opinion. Rather, the trial court's role is to make the initial determination whether the expert's opinion is relevant and whether the methods and research upon which it is based are reliable." 923 S.W.2d at 558. The court held that the trial court's exclusion of *Robinson's* expert testimony was not an abuse of discretion because "[i]t was not based upon a reliable foundation." *Id.* The court cited the fact that the expert "conducted no testing to exclude other possible causes of the damage . . . even though he admitted in his deposition that many of the symptoms could be caused by something other than contaminated Benlate" and stated that "[a]n expert who is trying [*30] to find a cause of something should carefully consider alternative causes." *Id.* at 558-59. The court further stated that the expert used "problematic" methodology and that, while "[s]cientists may form initial tentative hypotheses," by "coming to a firm conclusion first and then doing research to support it," the expert used unreliable methodology. *Id.* at 559. Finally, the court considered that "[the expert's] research and opinions were conducted and formed for the purpose of litigation." *Id.* The court held,

The fact that an opinion was formed solely for the purposes of litigation does not automatically render it unreliable. However, "when an expert prepares reports and findings before being hired as a witness, that record will limit the degree to which he can tailor his testimony to serve a party's interest." On the other hand, opinions formed solely for the purpose of testifying are more likely to be biased toward a particular result.

Id. (quoting *Daubert v. Merrell Dow Pharm., Inc.*, 43 F.3d 1311, 1317 (9th Cir. 1995) (on remand)).

In its motion for JNOV, Gharda asked the trial court to hold that the only evidence in support of the jury's answers to Questions One, Two, and Sixteen was [*31] expert testimony, that the testimony of each of CSI's experts amounted to "no evidence" because it was unreliable, and that, therefore, the testimony of each of these witnesses was inadmissible, and the court was barred by the rules of evidence from submitting it to the jury. Our task, therefore, is to review the testimony to determine whether the trial court erred in ruling that the testimony of these experts was unreliable and, therefore, should not

have been submitted to the jury, justifying the rendition of JNOV.

1. Gharda's Arguments in Support of JNOV on Expert Reliability

To establish that contaminated chlorpyrifos caused the fire that destroyed CSI's warehouse, CSI relied on the following experts' testimony: (1) Sammy Russo, a fire investigator, who testified that the physical evidence showed that the fire started in the southwest portion of the building in the hot box and that the damage to that area was consistent with a low-order gas explosion; (2) Harold Rice, the lead investigator from the Harris County Fire Marshal's Office, who also testified that he ended his investigation with the conclusion that the fire started in the hot box; (3) Roger Owen, an electrical engineer [*32] retained at Russo's request to inspect the hot box for mechanical or electrical malfunction, who determined that mechanical or electrical malfunction of the hot box could be ruled out as a cause for starting the fire in the hot box; (4) Andy Armstrong, a forensic chemist and chemical fire expert contacted by Russo to analyze the potential cause of the "differential burning" patterns around some of the drums in the hot box; and (5) Nicholas Cheremisnoff, a chemical engineer, who testified that the EDC contamination of the chlorpyrifos occurred at Gharda's plant.

Gharda and GUSA argue that all of these experts are neither qualified nor reliable. Therefore, we address the reliability of the testimony each of the experts gave to determine whether the trial court properly ruled in response to Gharda's motion for JNOV that all of their testimony amounted to no evidence and should not have been submitted to the jury.

2. Reliability of Sammy Russo's Testimony

Gharda argues that the testimony of Sammy Russo, a fire investigator who investigated the fire at issue in this case, was unreliable and should have been excluded. Gharda admits that Russo followed the correct methodology, namely, the National [*33] Fire Protection Association ("NFPA") guide for fire and explosion investigations, or "NFPA 921." However, it argues that while Russo claimed to follow NFPA 921 as his methodology, he did not do so faithfully. Gharda argues that (1) Russo did not follow NFPA 921's statement that fires usually start at the lowest point in the areas of greatest burn; (2) Russo did no testing, including failing to test his hypothesis about where the fire started; (3) Russo failed to conduct interviews with persons with knowledge about the events; and (4) Russo gave contradictory and evasive testimony regarding his ability to "identify the fuel that fed a hot-box-started fire" and the explanation for differential burn patterns.

a. Russo's Testimony

Russo testified that he followed the procedures and recommendations in NFPA 921 and that the physical evidence showed that the fire started in the southwest portion of the building in the hot box and that the damage to that area was consistent with a low-order gas explosion. He testified that each investigation effort is a little different because each fire is different, so there is not a predetermined list of steps for investigators to follow. Russo first heard [*34] about the fire on the news, and he was contacted by CSI's attorney a few days later to aid in the investigation into the cause of the fire.

Russo testified that the first thing he did was examine the outside of the building. He got information from CSI personnel about what materials and chemicals were in the building and where they were located, and he gathered material safety data sheets, which contain information about physical and chemical properties of the materials in the warehouse. Russo also interviewed CSI personnel, including Robert Blair, who was present when the fire first broke out. Blair told Russo that he heard a sound like a truck crashing into the building, and then, about forty-five seconds later, the fire alarms went off.

Russo further testified that he was working with another investigator who conducted interviews with the firefighters and related information back to him. Russo testified that he did not want to interview a lot of the firefighters because he had trained them and he did not want to influence them unduly.

After collecting information, Russo inspected the inside of the entire building with a team of investigators. He looked at burn patterns and at items [*35] that appeared not to have been damaged by the fire. Russo testified that the burn patterns he found all led away from the hot box. He stated that "there was a preliminary indication I had an area of origin in the southwest quadrant" because he "had seen the ridge vent [in that area] compromised on the video." He saw the hot box with the hinges "pushed open" and determined that "the fire spread was from that area." Russo also noticed "a distortion of the roof above the hot box that [he] typically see[s] in gas vapor explosions because when you get ignition, these vapor clouds tend to expand three dimensionally where I had distortion of the roof." Russo further testified that he examined the "fuel load" and could "see where the fire had followed the fuel past the wall behind the hot box."

Following his inspection of the building with a team of people, including some investigators who Russo believed were there on behalf of either Gharda or GUSA, all of the investigators made a list of the samples they would like to have taken. According to Russo, none of

the investigators expressed any interest in the northwest quadrant of the building at that time. Russo further testified that all of [*36] the experts had input into developing a sampling protocol. Russo was concerned about "the differential burning of the drums within the hot box, that even though it was everybody's understanding and my understanding that all the drums contained the same product, something very different, you know, from a reaction standpoint had occurred." Russo also testified that he contacted Andy Armstrong, "a competitor in the past in the laboratory business," and asked for his input as to the best protocol for collecting chemical samples from the drums in the hot box. He detailed the protocol used for conducting the 3M charcoal badge testing and explained how the testing canisters worked.

After the sampling was performed, Russo continued to inspect the facilities, removing additional equipment and other items of interest. He testified, "When you do a fire investigation, you've got to look at the whole picture. It's--it's got many, many components and you've got to systematically examine them and then either rule them in or out. So this is part of looking at other components in the structure." In addition to having an electrical engineer inspect fans, electrical boxes, and other electrical components [*37] of the warehouse, Russo recommended having another electrical engineer inspect the hot box because he "wanted to be sure it was either working right or not." Russo also testified that, after the building was razed, he examined the concrete slab to determine if there were any areas of extreme heat that he had missed on his earlier inspection.

Russo testified that the charcoal badges were removed for testing on April 9, 2004, and that his team "physically took samples from each drum." He also stated that he "didn't try to save all of the drums because this is a permitted facility under EPA, I believe; and you can't keep waste materials at a facility like this for more than 90 days. So we were under some regulatory pressure to get the samples out" Russo testified about the science behind the 3M charcoal badge tests and about how the tests were analyzed, and he stated that "in mass spectrometry, you can look at selected ions, selected fragments from classes of compounds." Finally, he testified that "the bottom line is that while the material appears to be basically the--the same product, there are differences within the product. They're not--they don't all demonstrate they're exactly [*38] the same. And it gives us some idea as to what compounds might be there. Toluene showed--showed up, and I think EDC showed up as well." He testified that the results of the badge testing told him "[t]hat the product is non-uniform or consistent, that there are differences within the product that makes me question whether or not all of the product was on spec."

CSI's counsel asked, based on Russo's review of the documents that were produced during the investigation and in the course of the lawsuit, deposition testimony, and news videos, "Have you formed an opinion which is based on reasonable scientific probability as to the origin of this fire?" Russo answered, "Yes, . . . [t]he origin is--is the area at the--at the hot box. And the point of origin, which is a refinement of the identification of origin, is within the hot box." He went on to explain the basis of his opinion, which was based in part on news footage, which early on showed fire in the area where the hot box was located, but nothing in the northwest corner, where Gharda argued the fire started. He looked at things like heating of the metal roof, burn patterns, paint discoloration, and the displacement of a ridge vent on the [*39] roof over the location of the hot box. He testified that the video showed firefighters entering the building through the northwest quadrant early on in the fire, and he stated that "[t]hey're reporting fire off to their right, which is where exactly I would expect it to be"--in the direction of the hot box area.

Russo testified that the fire progressed from the hot box area toward an area referred to as the "label room" where "there's a storage rack . . . that had cardboard boxes that would have been the first combustibles that would have been ignited." Russo also testified that early on in the fire, there was "[n]o damage on the other side of the building":

[Russo]: The totes hadn't started to burn. So they would not be a--particularly a cause. You want to see where the fire starts and how it progresses. You got to add the dimension of time when you're looking at fire patterns.

[CSI's counsel]: And by "totes" are you talking about the same solvent area that we talked about . . . earlier?

[Russo]: The solvent area's in here. . . . That's the area of the building that collapsed. And you look at the after-the-event pictures, that's where the fire department let that burn so that didn't all [*40] run out and contaminate the environment and there's a tremendous amount of fire damage and if you're not trained in fire investigation, you might just immediately say, Hey, greatest burn at the lower burn, that's it, without taking into consideration the dimension of time and that would be a false origin.

Same way with that northwest corner.

....

If you just read literally NFPA 921, it's the greatest burn at the lowest point and the reason they say that is because fire burns up and out. It rises. Okay? *So where it starts it's supposed to do the greatest damage at the lowest point and spread from there and it will also do the greatest damage to the roof.*

If you look at this and don't take into account the time element and that this had solvents there, which are good fuels, and the fact that the fire department didn't suppress that, you--*follow NFPA 921 and you're--you're likely to pick that as an origin. . . . or the northwest corner there. But it was not involved in the--the initial video.*

(Emphasis added.)

Russo also testified that his examination of the hot box revealed evidence of damage to the hot box that was

very consistent with what I see quite frequently in my type of work, natural [*41] gas explosions, as opposed to dynamite or something like that. It's a very low order explosion typically characterized by a deflagration, which is a fancy word for a flash fire that accelerates. When you trap a fire in a confined space and you add temperature from the burning, for every 10 degrees Centigrade that you increase the temperature, you double the reaction rate. So by having a vapor fire in a confined space, you start increasing the rate and you can accelerate that until you build a--you know, build pressure in the box. In this case, you build very low pressure, probably in the order of 1 to 3 pounds.

With the 15,000 or so square inches of surface area on the door, 1 pound of pressure will give you 15,000 pounds of force against that front door. It didn't take a lot of pressure to spring the front door latches, bend the hinges and the rumble or boom is the decompression of that material into the--you know, as the doors open.

Russo went on to explain how the remainder of the damage to the hot box was consistent with his belief that a low-order explosion occurred. He also testified that the damage to the outside of the hot box indicated that there was not "enough temperature on [*42] the outside of the box to get past the insulation of the hot box to heat the contents, you know, to their flammable level." Regarding the vent at the back of the hot box, which Gharda argues was the weakest area of the hot box and would have failed in the event of a low-order explosion, Russo disagreed, stating that a "control rod going through the vent . . . reinforce[d] the vent. Plus the surface area there, that's a very small vent. You don't have a lot of pounds per square inch on the surface area of the vent. Plus you got a steel right up the middle that holds the vent in place. You're going have to [sic] bend that steel rod or disjoin the vent flapper itself from the rod." He testified that the "pressure differential between the inside of the box and outside of the box is relatively small. You don't have enough force" to push the vent open, and that in his scientific analysis of the issue, he would not have expected the vent to fail or be breached.

Russo further testified that he examined burn patterns all over the building and that he examined the burn patterns from within the hot box and outside of the hot box. Russo also testified that he examined and discarded the theory that [*43] some propane from nearby tanks might have leaked out and come into contact with the hot box to cause the explosion or that the smaller hot box might have somehow been involved. He examined burn patterns and other characteristics of the fire distribution.

Regarding the bungs, he testified, "[Y]ou notice the bungs [are] removed. Those bungs, after the low order explosion, are going to be in the same spot. You don't have differential pressure to blow those bungs out or give direction to this--this type of event."

Russo testified that all of his investigation indicated "the fire actually emanating at the hot box and then mov[ing] into the combustibles of the label storage room." He testified that he used the scientific method to arrive at his conclusions and stated, "What I'm trying to do is bracket the area of origin, so if all--either if all the

indicators point to it or there's something that says, Hey, you're not right. So I'm literally looking for that."

During cross-examination, Russo agreed that the chlorpyrifos drums in the hot box "showed no signs of explosion or high pressure . . . from within the drum[s]." When counsel asked, "And you saw at least to some extent, the ones you could [*44] see, you had the bung caps sitting right up there on top of the drums where they had been set by the workers?" Russo replied, "Yes, sir. I didn't--I didn't see bungs on any drums."

Regarding testing, on cross-examination, Russo testified that the 3M badge testing was the only testing he was aware of CSI having done--the other samples that were collected from inside the chlorpyrifos drums were never tested, "though there [were] other tests on other pieces of equipment." Russo also testified that the 3M badge test was completely different from testing "the virgin product" before it was damaged by fire. Regarding testing the coke and ash buildup from the burned drums, Russo testified that, in some ways, the 3M badge test was different and in some ways it was similar. He stated, "[O]ne of the things you would do with the coke is to heat the coke, drive the vapors out of the coke and absorb it into a charcoal strip or, in essence, a 3M badge. So in part this would be exactly the same analysis that's conducted on the coke material."

Regarding the results of the 3M badge testing, Russo testified that type of testing "can be" both qualitative and quantitative "with appropriate standards and analysis. [*45] It's used every day in the laboratory to measure how many parts per million or how many parts per billion of compounds you have." He testified that in this case, the testing results were not quantitative, but that the results did present the relative amounts of particular compounds.

Regarding differential burning, Russo testified that he identified the area around drums two and three that showed different burn patterns, and he concluded that the drums in that area were the ones that contained the contaminated chlorpyrifos. Russo testified that he was not asked during his direct examination about which contaminant caused the problem. Russo again testified that he did not interview the firefighters--that he had another investigator do that and report back to him the information developed in the interviews. He testified that firefighters "saw fire in the northwest corner and that when they made entry, they saw it to the right. They entered the main door and saw it to the right." Russo also confirmed that the drums that he identified as containing the contaminant were either TF-2, TF-3, or TF-4 and that those same drums did not show any EDC levels in the testing done by Dr. Armstrong.

Russo [*46] further testified that he received a number of documents from Gharda, but, regarding testing done by Gharda or other experts, "[t]he chemistry has not been my assignment. And I--I--there are chemists to evaluate that." He testified that he did not conduct any calculations or testing to determine what "the yield strength of [the hot box latches] were" because he did not need to: "I know it failed under the conditions of the event. I know that's a fact." Russo agreed that the drums from the hot box had been exposed to other chemicals during the fire, before the charcoal badge tests were performed. He testified that was "why we were comparing the different badges to see what was the same in all of the drums. That would be material that was absorbed from the warehouse. What we're looking for are spikes in chemicals that were not evenly distributed in the sample." He testified, consistent with his deposition testimony, that he was not prepared to identify which chemical caused the fire or what the ignition source might be. He testified that possible ignition sources he considered were

electrical sparking, perhaps a connection on the heater strips. That's why I asked that--that hot box be sent [*47] to an electrical engineer, Mr. Owens, who made an examination to see if there were any sparks. Also made a determination as to whether or not the hot box is operating correctly. That's one possibility.

Thermal degradation of the product. The product, when it degrades, it becomes exothermic, which means it's self-heat generating, and that can accelerate the--the product to a temperature that you can get--you will get auto ignition or can get auto ignition.

Obviously with a recirculating system, if you got particulates in that system, you can generate static electricity. . . . At this point I don't have an ignition source that I'm willing to identify within a reasonable degree of scientific probability. I'll defer to the chemist who's looked at that.

GUSA's counsel asked, "If no one can tell us how much fuel was in there, then we can't possibly say what caused this fire?" Russo responded, "I--I wouldn't agree with that. I just said I wouldn't do it. . . . I would want to know that I had sufficient fuel to reach the lower explosive limit and that that would be available in the original product."

On redirect-examination, Russo testified that his investigation indicated that the fire started with [*48] "ignitable vapor within the hot box" and that the only thing in the hot box was drums of chemicals from Gharda, so he concluded, based on those two facts, that the ignitable vapor came from the Gharda chemicals. He testified that all of the evidence he looked at led to that conclusion and that the fact that he did not have an ignition source that he could identify "probably means I'm just not smart enough to identify it or I haven't seen enough evidence. But the bottom line is we did have ignition. So I know it exists. It's not a--not an imaginary thing."

He also testified that the products in the warehouse fire had been "significantly heat stressed. EDC's a very volatile product. For it to remain after a fire like this would be a bit unusual and might indicate a very high concentration" but that he "would defer to the chemist the things" that were within the chemist's purview. Gharda's attorney asked if he could have concluded two days after the fire what caused it. Russo testified that "there may be fire investigators who would determine the cause as being an explosion in the hot box and it would be possible to do that," but he did not do that. He testified that he had "a higher standard [*49] of scientific responsibility to eliminate a number of possibilities, and I systematically did that for my job" and that he had to follow the scientific method. He specifically testified that he did not start his investigation with any particular conclusion in mind and that he does not "reverse engineer" his investigations.

b. Analysis

To show that Russo's testimony was unreliable as a matter of law and, therefore, barred by the rules of evidence and improperly submitted to the jury, Gharda had to show that Russo was unqualified or that his testimony was not relevant or reliable. *See Mendez, 204 S.W.3d at 800; Robinson, 923 S.W.2d at 556.* Gharda challenged the relevance and reliability of Russo's testimony. It makes no argument and cites no authority showing that Russo, as a professional fire investigator, was unqualified to opine on the origin of the fire. We conclude that Gharda failed to show that this testimony should have been barred.

Russo testified that the nature of investigating the origin of a fire is something that is not readily subject to testing. Rather, it involves application of some standard protocols and depends to some extent on the experience and subjective interpretation [*50] of the investigator. In this regard, Russo's investigation is comparable to other types of accident-reconstruction testimony, in which the supreme court has held that it is appropriate to analyze whether the expert's opinion actually fits the facts of the case and whether there are any significant analytical gaps

in the expert's opinion that undermine its reliability. *See Hughes, 306 S.W.3d at 235; Ledesma, 242 S.W.3d at 39.* Russo testified regarding the very thorough nature of his investigation, the multiple theories or potential sources for the fire he considered and the reasons he rejected many of those theories, and the use he made of other information and physical evidence from the fire. He based his opinion regarding the location of the origin of the fire on video footage taken by news helicopters during the fire, on firefighter testimony, information about the contents of the warehouse, burn patterns and physical evidence at the scene, including the nature of the damage to the hot box itself, and several other sources. Thus, we conclude that, although his theory, by nature of the investigation itself, does not lend itself to testing, his opinion fits the facts of the case and [*51] there are no significant analytical gaps in his testimony explaining why he determined that the fire originated in the hot box. *See Hughes, 306 S.W.3d at 235.*

Gharda's argument that Russo did no testing, including that he failed to test his hypothesis about where the fire started, is without merit. Gharda argues, "For example, if the hot box had contained drums with water, Russo would have reconsidered his origin assumptions. Though the drums did not contain water, the same principle applies." Furthermore, the evidence shows that Russo conducted testing on the contents of the drums and recommended that a chemist interpret those tests. The tests showed that the drums did not contain a benign substance such as water; rather, they contained known flammable substances. This was sufficient testing to support Russo's conclusion that ignition of flammable vapors in the hot box was the source of the fire. Russo also had Owen, an electrical engineer, inspect the hot box and other items for a mechanical or electrical malfunction.

Russo's testimony is also reliable when considering several other *Robinson* factors. *See Whirlpool Corp., 298 S.W.3d at 639-40* (recognizing that some subjects do not lend [*52] themselves to scientific testing and scientific methodology, but that many cases require evaluating expert testimony by considering both *Robinson*-type factors and by examining for analytical gaps in testimony). The methodology Russo used in conducting his investigation, NFPA 921, has been subjected to peer-review and publication, and it has been generally accepted as valid by the relevant scientific community. It is the method used by the Harris County Fire Marshal's Office and many other accredited fire investigators, and Gharda does not dispute the validity of the NFPA methodology. *See Mendez, 204 S.W.3d at 801* (discussing *Robinson* factors).

Gharda claims, however, that Russo violated NFPA's standard that the investigator "interview people with knowledge of information about the events" by fail-

ing to interview firefighters. However, this is a mischaracterization of the evidence. Russo testified that he did not personally interview the firefighters, but a member of his investigatory team conducted those interviews and reported back to him. Thus firefighter interviews were conducted as part of Russo's investigation.

Gharda also claims that Russo did not follow NFPA 921's statement that [*53] fires usually start at the lowest point in the areas of greatest burn. However, Russo's testimony explained why CSI's fire presented an unusual situation and why he concluded that the fire started in a different location, namely, the initial videos did not show that the lowest point was involved in the early stages of the fire. He also testified that some of the chemicals in the warehouse burned hotter than other materials in spite of burning for shorter amounts of time, which would affect the appearance of the burn patterns, and that firefighters made the decision to let certain areas of the warehouse burn longer than others as a method of preventing environmental contamination, which also affected the appearance of where the "greatest burn" would have occurred. Russo testified that NFPA 921's recommendations are guidelines that must be used flexibly because every fire investigation is unique, just as each fire is unique. Gharda presented no contravening evidence that NFPA recommendations are inflexible standards that must be strictly followed in every case. Nor did it present any evidence that the fire actually started at the lowest point. Therefore, it failed to carry its burden [*54] of showing that Russo's testimony should have been barred on this ground.

The methodology Russo employed has been put to non-judicial uses--in fact, its primary use is to determine the origin of fires. Russo testified that his own involvement in this case began as a fire-origin investigator in the immediate aftermath of the fire and that he formed his opinions regarding the origins of the fire in that capacity. *See Robinson, 923 S.W.2d at 559* (holding that, although opinion formed solely for purposes of litigation does not automatically render it unreliable, "when an expert prepares reports and findings before being hired as a witness, that record will limit the degree to which he can tailor his testimony to serve a party's interest") (quoting *Daubert, 43 F.3d at 1317*).

Furthermore, Russo testified regarding his general use of the scientific method and proper investigative protocols--he conducted a thorough investigation of the premises, collected several samples, and investigated other possible causes that he eventually ruled out. His testimony explained the methods he used--generally accepted methods--to reach his conclusion regarding the place of origin of the fire. Gharda presented no [*55] evidence that the methods used by Russo to reach his

conclusion regarding the place of origin of the fire were not a generally accepted methodology.

Finally, Gharda argues that Russo gave contradictory and evasive testimony and points to Russo's testimony about the progression of the fire beyond the hot box and the burn patterns surrounding the area of the hot box and about the possibility of the fire starting outside the hot box. Gharda argues that this testimony demonstrates that Russo began with a specific result in mind and did not conduct his investigation to test that theory but instead just looked for evidence to support it.

However, viewing Russo's testimony as a whole, we conclude that Gharda mischaracterizes his testimony. Russo testified that he conducted a thorough investigation of the entire property and identified several different alternate theories that he eliminated. He examined burn patterns and fuel load as well as sampled and examined equipment and electrical connections throughout the building. Finally, he testified that he used the scientific method and conducted a thorough investigation over the course of several weeks to arrive at the conclusions he presented.

We [*56] conclude that CSI established Russo's reliability and that Gharda failed to carry its burden of showing, in its motion for JNOV, that Russo's evidence was unreliable. We hold that the trial court erred in concluding that Russo's testimony was unreliable, constituted no evidence, and should have been barred. Therefore, the trial court erred in counting Russo's testimony as no evidence of defect, negligence, or causation.

3. Reliability of Harold (Buddy) Rice's Testimony

Gharda argued in its motion for JNOV that Rice, the lead investigator from the Harris County Fire Marshal's Office, was unqualified and unreliable because he (1) repeatedly violated the NFPA standards he purported to follow by focusing his investigation on the hot box after CSI's employees told him the hot box was the only thing on, (2) did not sufficiently investigate the warehouse and failed either to determine an ignition source or to conduct a thorough investigation into finding an ignition source, (3) testified inconsistently, (4) did no testing, and (5) was not competent to investigate the fire. To support its argument that Rice was unqualified to investigate the fire and that his testimony was unreliable, Gharda [*57] points to *Wal-Mart Stores, Inc. v. Merrell, 313 S.W.3d 837, 839-40 (Tex. 2010)*, to support its contention that "[a]n expert's failure to rule out potential ignition sources makes his testimony unreliable," and to *Whirlpool, 298 S.W.3d at 642-43*, to support its contention that "failure to test or measure or calculate makes an investigation incomplete and testimony unreliable."

Gharda also argues that Rice was not a competent witness because he was fired from the fire marshal's office for failing to follow up on witness interviews, he did not have the proper experience with explosions, and he could not define standard fire investigation terms.

a. Rice's Testimony

Rice was the lead investigator from the Harris County Fire Marshal's Office who responded on the morning of the fire to investigate its cause and origin. Rice testified that he was a certified arson, fire, and explosion investigator and that he had twenty-two years of experience doing fire investigations, and he agreed with Russo that NFPA 921 was the proper methodology for investigating the CSI fire. He also testified that NFPA 921 permitted testing of the investigator's hypothesis regarding the origin or cause of the fire to [*58] be done through either experimentation or deductive reasoning.

Rice's team of investigators interviewed witnesses from CSI and from the first-responders, including several firefighters. A CSI employee told him that the hot box was the only equipment that was left on the night before the fire. Rice concluded, after observing burn patterns and other evidence at the scene, that the fire originated in the hot box. His report concluded that the probable cause of the fire was the ignition of an unknown vapor inside the hot box.

Rice testified that he did not thoroughly investigate the entire warehouse because he did not have access to all portions of the warehouse, due to fire damage, and he conceded that he did not spend any significant amount of time examining the northwest quadrant of the building--the area in which Gharda argued that the fire originated.

b. Analysis

Rice used similar methodology and fire investigation procedures as those we have already determined were reliable in our analysis of Russo's testimony. Gharda presented no evidence that Rice violated NFPA standards by focusing on the hot box under the circumstances of this case. Nor did it present any evidence or argument that [*59] Rice's investigation of the warehouse was insufficient under NFPA standards. Gharda's contentions that Rice failed to conduct a thorough investigation under NFPA standards, failed to determine an ignition source, and was not competent to investigate the fire are all unsupported by the record and contrary to it.

We conclude that Gharda failed to show in its motion for JNOV that Rice's testimony was unreliable and inadmissible. Therefore, we hold that the trial court erred in concluding that this testimony amounted to no evidence and should not have been submitted to the jury.

4. Roger Owen's Testimony

Gharda does not raise any arguments regarding Owen's qualifications or reliability in its appellate brief. However, CSI argues that his testimony supports the jury's verdict and should have been considered by the trial court in ruling on Gharda's motion for JNOV.

Roger Owen testified as an expert electrical engineer and expert in fire causation. His investigation included removing and inspecting multiple electrical boxes and wiring, in addition to an examination of the fan in the hot box. Based on his inspections, he ruled out mechanical or electrical malfunction as the cause of the fire. [*60] Owen also testified, during Gharda's presentation of its case, that he ruled out mechanical or electrical failure of the hot box as the cause of the fire. This unchallenged evidence demonstrates that CSI retained experts to investigate multiple potential causes of the fire and supports the jury's verdict.

5. Reliability of Andy Armstrong's Testimony

Gharda argued in its motion for JNOV that the testimony of Andy Armstrong was not reliable and should have been kept from the jury. Specifically, Gharda argues that (1) Armstrong did not offer reliable testimony of defect or causation because neither he nor Cheremisinoff, one of CSI's causation experts, tested their defect, ignition, or causation theories, (2) no literature supported Armstrong's claim that allegedly defective chlorpyrifos could explode or ignite, and (3) Armstrong never identified an alleged defect, a source of ignition, or a cause of the fire.

a. Armstrong's Testimony

Armstrong is a forensic chemist and chemical fire expert contacted by Russo to analyze the potential cause of the "differential burning" patterns around some of the drums in the hot box. He used 3M charcoal testing badges to test vapors in the drums and detected [*61] the presence of toluene and EDC in some of the drums. Armstrong testified that the material in the drums was not uniform, that toluene and EDC were both flammable solvents, and that either can cause an explosion or fire if present in a sufficient amount. Armstrong also opined that EDC contamination caused rapid decomposition of the chlorpyrifos and created significant flammable vapors that auto-ignited.

Armstrong testified that he was a chemist and that he ran a laboratory called Armstrong Forensic Laboratory. He testified that his laboratory "got its foundation in fundamental work doing fire investigation, identifying ignitable liquids from suspect fires" and that it currently does the same thing "as well as environmental testing."

He testified about his education and other professional background.

He testified that he became connected to this case when some samples were submitted to him for testing and that he subsequently rendered his opinions. He testified that the type of testing he used in this case-- "ignitable liquids recovery"--was "primarily developed to assist a field investigator to establish what burned at a fire," that "over the years it's developed into a standard test. It's [*62] been a standard test since about 1989, 1990, when it was first developed," and that "[i]t's been tried and true, and it was not developed specifically for this endeavor." He further testified that he tested the 3M badges sent to him by Russo in accordance with "ASTM E1618,"⁷ which provides the standard test method for ignitable liquid residues in extracts from fire debris samples by gas chromatography-mass spectrometry, like the 3M badges. He detailed the findings in his report, beginning with the steps he went through to comply with the standard for testing and the results.

7 "ASTM" stands for the "American Society for Testing and Materials."

Attorneys for Gharda and GUSA both objected to this testimony based on the fact that Armstrong did not "qualify under [the] Daubert/Robinson standard. There's no reliability to his testimony. . . . There's no scientific basis for his testimony as it relates to this case." The trial court overruled this objection.

Armstrong then testified that the results of the badge testing showed that, for drum TF-1, "a lot of toluene [was] produced in the recovery. Ultimately we went back and looked at this same analytical data and found detectable levels of ethylene [*63] dichloride or dichloroethylene, depending on which way you want to name it. . . . EDC." CSI's attorney asked him why he went back to look for EDC, and Armstrong testified:

When we initially did the analysis, I have no knowledge of how this material is manufactured, I have little knowledge of what burned in the fire. I'm just reporting what the vapor space is producing from these different barrels.

We have a high level of toluene. Toluene is . . . a flammable liquid. And not knowing what to anticipate, we report that we have significant levels of toluene in the system left over after the fire.

Ultimately, through discovery, the attorneys find out that toluene is not used in the production of chlorpyrifos; EDC is used in the production of chlorpyrifos.

And I was requested to go back and look at the analytical data and see, did you detect in the original analysis that EDC was present at a detectable level.

Armstrong testified that he did as requested, found that EDC was present, and wrote a report on that finding.

Armstrong testified that he then "looked at the analytical information, the material safety data sheets ['MSDS'] that were provided" by Gharda for "warnings on the system . . . [,] [*64] for any kind of chemical hazards that may [be] present, the flashpoint, the decomposition temperature, everything you can find out about this particular product." He stated that U.S. law requires companies like Gharda to furnish the MSDS so that consumers can understand the properties of the chemical materials. He learned that the material would thermally decompose, according to the MSDS, at 266 degrees Fahrenheit. He testified that he did further research into the thermal ability of chlorpyrifos by examining other internal documents stamped with GUSA's name that indicated lower temperatures for decomposition. He found that there was a "great discrepancy" between the decomposition temperature provided by the Gharda MSDS and the internal documents Gharda had on the subject.

Armstrong testified that he relied on another study completed by a third-party lab, which reported that "violent decomposition" of chlorpyrifos would occur at 222 degrees Fahrenheit.⁸ He testified that he found another article "published by the Australian equivalent to the EPA indicating thermal decomposition at low temperatures. We found additional material safety data sheets from Dow and other producers of the [*65] product indicating that it would spontaneously decompose under elevated temperature." Armstrong concluded that this information told him

that we have a mechanism to generate a lot of vapor inside this hot box due to the thermal decomposition, spontaneous thermal decomposition. We know that the intent of the hot box was to melt the product.

Chemically we know that reactions go faster the higher the temperature. Chemically we know that reactions go faster in solutions than they do in solids. So we have a lot of independent information about the properties of the material, and most of that information came from Gharda.

8 The record reflects that CSI sought to admit the study, which it claims was produced by Gharda in the course of litigation, and that the published study itself stated at the bottom that it was sponsored by Gharda. Gharda objected to its introduction into evidence as hearsay, and the trial court sustained the objection. Armstrong was allowed to testify that he relied on it, but he was not allowed to testify as to "what it [was]." Armstrong testified on the record that the study was performed by Inveresk and was sponsored by Gharda.

Regarding the ignition source of the vapors [*66] that were being produced in this system, Armstrong stated:

It's fairly obvious in looking at this data and the stability of the compound and the temperatures that were invoked, 180 degrees Fahrenheit, that over an extended period of time, this material was going to decompose. That's a given.

....

[T]here are basically three things that you can relate to the ignition. Either I had a spark--and the static can be generated because of the circulation of gases in the hot box--or I had a significant concentration of something--what the chemist would call a free radical.

The generation of the free radicals comes from this particular barrel, because it had the most damage, where it began to decompose early.

Armstrong testified that particular barrel would reach its melting point earlier than the other barrels because, according to "Raoult's Law," the melting point of a material is lower when there is an impurity in that material. He testified that

based on all the information that I read, that there was an impurity in some of the drums. As a result of that impurity, I lower the temperature, it begins to melt at a lower temperature.

When I melt it at a lower temperature, the liquid molecules have [*67] a chance to bang into each other very nicely. That causes them to decompose.

When I add more decomposition products, I have more impurities. When I have more impurities, the melting point keeps going down. So it just takes a little bit to start it, but then I get the whole barrel melted early.

And from the analytical data that was provided to me, this material starts to decompose. When it decomposes, it generates heat. When it generates the heat, because I'm in a sealed box, big barrel, I don't have any place for that heat to go, the internal product gets hotter.

And when it gets hotter, we're going to cook the egg a little faster. And sooner or later we're going to generate so much heat that it's going to reach one of these multiple decomposition temperatures and erupt.

When it erupts, it generates a lot of vapor in the hot box. I have in that vapor free radicals. I have partial molecules. I've got a very active gas I generate a large amount of gas in this hot box.

It [*68] is auto ignition. It is going to start a combustion process because I have such a high concentration of free radicals. Fire is nothing more than a free radical reaction that is sometimes controlled and sometimes not.

Armstrong testified that toluene is a thermal degradation product--a by-product of the chemical reaction that occurs as the chlorpyrifos decomposes. However, he did not believe the EDC was a thermal degradation product of this decomposition because he "could not find a mechanism, a chemical process, to generate EDC by the thermal decomposition of the product." Thus, he concluded that the "EDC was in the container at the time of manufacture and shipping."

He concluded:

As the exothermic decomposition occurred, the system got hotter. As it gets hotter, the reaction proceeds more rapidly, and I generate an awful lot of smoke inside the vessel.

And at some point in time, it either was concentrated enough to auto ignite or a static discharge caused it. And it really doesn't make much difference whether the

toluene got ignited first or the EDC got ignited first or some other decomposition product, the other two unknown and unidentified, got ignited first.

It's the complex smoke system [*69] inside this box with the oxygen that touched off the event that blew open the doors that burned the building down.

Armstrong testified that CSI had not had this problem before, in spite of its frequent use of the same product, because it had not received contaminated product before and that the product was defective in the way it was marketed because the "decomposition temperatures were not correctly reported to the general public on the material safety data sheets. It decomposes at a lower temperature." He also testified that a reasonable scientific probability existed that there was a manufacturing defect in the batch of chlorpyrifos in question. He testified that he considered other possibilities and "ran through quite a few scenarios in my head as to how I can get this system to do what it did" and that he followed the scientific method in arriving at his conclusion.

On cross-examination, Gharda's lawyers questioned Armstrong about his allegedly changing opinions: his original opinion that toluene was the contaminant, then his subsequent opinion that EDC was the contaminant and was ignited by an unknown ignition source, and then his final conclusion that EDC was the contaminant and [*70] the vapors spontaneously combusted--that "it just heated up so hot it ran away on its own and didn't even need an ignition source." Armstrong testified,

But, sir, that is the ignition source in a self-heating spontaneous combustion. I don't have an independent piloted ignition source. I have to have a high concentration of reactive molecules to cause it.

Now, I did not say that was the exclusive ignition source. There's still the probability--or possibility of static in the system because I've got circulating air. And I've said many times that I cannot differentiate between the two; but it is my opinion as a chemist and what I know about self-heating, and how a fireplace catches on fire and a few other things, that it's an overconcentration of free radicals in the system that caught fire.

The question in my mind is the source of the free radicals.

Regarding his changing opinion, Armstrong testified, "I think that's evidence of the use of the scientific method. As additional information comes forth, as a scientist I have the privilege and responsibility to modify the hypothesis or modify my opinion based on the evidence presented." Gharda's attorney asked whether everything Armstrong's firm [*71] did involved litigation, and Armstrong replied, "No Everything the company does may become involved in litigation, not that it is involved in litigation. . . . We analyze children's toys for lead and phthalates. We do a lot of different things."

b. Analysis

Armstrong's testimony indicated that he relied on the methodology established by ASTM E1618 in conducting and interpreting the charcoal badge tests. He also relied on established scientific principles and on information regarding the scientific nature of the chemicals involved that he received from Gharda itself and from other published tests. Thus, his opinion was based on methodologies and techniques that had been published and subjected to peer review and that had been generally accepted as valid by the relevant scientific community. He also testified that these principles were used for many purposes and were not just for judicial use. He testified that he was contacted by Russo in the course of Russo's investigation into the origin of the fire, that he consulted with Russo on the best way to collect vapor samples, and that he was asked to provide the chemical expertise necessary to aid in Russo's investigation into the [*72] cause of the fire, all prior to being asked to testify at trial. *See Mendez, 204 S.W.3d at 801* (discussing *Robinson* factors).

Armstrong used these established testing methods to test the vapors remaining in the drums after the fire, and he based his conclusions on those test results. He also testified that further "testing" of his theory was not possible because it would essentially require recreating the explosion on the same scale as the one that caused the initial fire. He based his theory of how the fire occurred on the known chemical properties--obtained from Gharda itself and from other published laboratory tests--of the chlorpyrifos and the flammable vapors shown by the badge tests to have existed in a few of the drums.

Gharda argues that Armstrong reached his conclusion first and then tried to justify it and that he failed to conduct proper testing. According to Gharda, the only tests he performed--the 3M charcoal badge tests--were faulty and proved nothing. Gharda failed, however, to produce any evidence that the 3M badges were not tested in accordance with the ASTM standard test method for ignitable liquid residue and failed to show what other testing could have been done that [*73] would have

been helpful to support Armstrong's theory. It is not in question that the particular vapors identified by Armstrong--the EDC contaminant and toluene decomposition by-product--are flammable. The known scientific principles that Armstrong related support his conclusion, and in order to recreate the spontaneous combustion or static charge within the system, he would have needed to basically recreate the entire explosion.

We conclude that the contentions made by Gharda regarding the reliability of Armstrong's testimony are actually arguments concerning the propriety of the conclusions that a juror could have drawn from Armstrong's testimony. These contentions are not supported by the testimony, and they do not concern Armstrong's qualifications or methodology. Gharda failed to show that this testimony did not satisfy the *Robinson* factors for determining the reliability of expert testimony, and we conclude that it does satisfy those factors.⁹ *See id.* (citing *Robinson*, 923 S.W.2d at 557 (reciting factors in determining reliability)). Therefore, we hold that the trial court erred in ruling that Armstrong's testimony amounted to no evidence and should not have been submitted to the [*74] jury.

9 Gharda also argues that Armstrong's testimony has been excluded as unreliable by at least one other court. We conclude that this argument is not relevant to the admissibility of Armstrong's testimony in this case.

6. Admissibility of Nicholas Cheremisinoff's Testimony

Finally, Gharda argued, and the trial court agreed in entering its JNOV, that Nicholas Cheremisinoff's testimony regarding flaws in the manufacturing and quality control processes at Gharda was unreliable so that his testimony amounted to no evidence and should not have been submitted to the jury.

a. Cheremisinoff's Testimony

Cheremisinoff was CSI's expert on Gharda's manufacturing process and quality control. He testified that he has a Ph.D. in chemical engineering and has worked for several chemical manufacturing plants, including Exxon. He testified that he reviewed the manufacturing and quality control processes used by Gharda in manufacturing the chlorpyrifos. He also reviewed witness testimony, the product specifications provided by Gharda, the physical evidence and forensic samples available after the fire, and the testing of the retains--the samples of chlorpyrifos retained by Gharda from the batches sold to CSI--performed [*75] by Gharda's experts. Cheremisinoff opined that the flaws in the manufacturing and quality control processes at Gharda made it "quite possible, well within scientific certainty, that there are

manufacturing flaws" that led to contamination of the chlorpyrifos at the plant. He also testified regarding flaws in Gharda's sampling methods and opined that testing of the retains was not a reliable way to determine whether the chlorpyrifos was contaminated at the time Gharda manufactured it and sealed it into the drums.

b. Analysis

In its motion for JNOV, Gharda argued that Cheremisinoff testified in terms of the "possibilities" and did not offer reliable testimony on negligence, existence of a defect, or causation. Specifically, it argued with respect to these claims that Cheremisinoff misunderstood Gharda's production process and never observed Gharda's plant or procedures; instead, he only reviewed Gharda's manufacturing protocols. Gharda also argued that Cheremisinoff relied on "facts contrary to actual facts" when testifying about the amount of EDC in the two drums; that he did no testing of Gharda's procedures, had no peer-reviewed studies criticizing Gharda's procedures, and cited no [*76] publications criticizing those procedures; that he could not identify an ignition source; and that he "failed to follow a methodology or account for facts contrary to his opinions."

However, Cheremisinoff explained, using scientific principles, why Gharda's testing procedures were insufficient. Cheremisinoff also testified that he used generally accepted scientific principles relating to proper testing methods to support his conclusions. Gharda has presented no evidence that this testimony was false or that the testing principles used by Cheremisinoff were not reliable. Finally, regarding Gharda's complaint that Cheremisinoff could not identify an ignition source, Cheremisinoff's testimony indicated that he was not asked to investigate or reach any conclusion on a possible ignition source. Armstrong was CSI's expert on identifying an ignition source. We conclude that Gharda failed to show that Cheremisinoff's testimony was unreliable under the *Robinson* factors. *See Mendez*, 204 S.W.3d at 801 (citing *Robinson*, 923 S.W.2d at 557) (reciting factors in determining reliability)).

7. Conclusion on Reliability of CSI's Expert Witnesses and Response to the Dissent

In sum, Russo and Rice provided [*77] sufficient evidence on the origin of the fire, and Armstrong provided sufficient evidence on the cause of the fire. Cheremisinoff provided evidence of defects in the manufacturing process that could have allowed a reasonable juror to conclude that Gharda was responsible for the contamination that Armstrong identified as the cause of the fire. We hold that the trial court erred in deeming any of CSI's expert testimony to be unreliable, much less all of it, and in granting JNOV on the ground that the rules

of evidence barred this testimony from consideration by the jury.

The dissent argues that, in examining the testimony of each expert witness, we used "a flawed approach" that "fail[s] to critically analyze the substance of what each expert presented to the jury." Slip Op. at 15-16. The dissent argues that because each expert's testimony "depended on some critical element that had to be supplied by another expert," our analysis is incorrect. Slip Op. at 16. However, in a case involving complicated scientific evidence, such as this one, it is improbable that a party will be able to find one expert witness who is an expert in all necessary areas of scientific inquiry. Thus, if we were [*78] to conclude, as the dissent seems to suggest we should, that Russo, the fire origin expert, was also required to be an expert in the areas of chemistry, mechanical engineering, electrical engineering, and manufacturing design for chemical products, CSI and companies involved in similarly complex litigation would never be able to support their cases.

We maintain that the correct approach to determining the reliability of expert testimony is to evaluate the qualifications and reliability of each particular expert's testimony, as we did here. As the Texas Supreme Court has held, "[i]f an expert relied upon unreliable foundational data, any opinion drawn from that data is likewise unreliable." *Helena Chem. Co.*, 47 S.W.3d at 499. However, if we determine that an expert relied upon reliable data and methodology in reaching his opinion, then the expert's opinion can properly be considered by the jury. See *id.* Texas law has long maintained that expert witnesses may rely upon information about which they have no personal knowledge. See, e.g., *TEX. R. EVID. 703* (providing that expert may base opinion on facts or data "perceived by, reviewed by, or made known to" him and may consider evidence [*79] that would be otherwise inadmissible if it is "of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject"); *In re Christus Spohn Hosp. Kleberg*, 222 S.W.3d 434, 440 (Tex. 2007) (orig. proceeding) (holding that experts may rely on hearsay, privileged communications, or other information that lay witnesses may not); *Sosa v. Koshy*, 961 S.W.2d 420, 427 (Tex. App.--Houston [1st Dist.] 1997, *pet. denied*) (holding that accident-reconstruction expert was allowed to rely on statements by eyewitnesses in forming opinion); *Noriega v. Mireles*, 925 S.W.2d 261, 264-65 (Tex. App.--Corpus Christi 1996, *writ denied*) (stating that expert witnesses in medical-malpractice case are often forced to rely upon medical records to form opinions, particularly in situations where plaintiff is deceased). Thus, as long as a court determines that the expert had a sufficient basis for his opinion, that opinion may be considered by the jury. We disagree that each expert's testimony must "bol-

ster" that of the others. See Slip Op. at 28. Here, no expert relied on the testimony of another as a *source* of his conclusions and opinion. Rather, each expert depended [*80] upon the others for the *context* of his conclusions and opinion. It is not improper for each expert witness to testify regarding a separate question in the analysis of a complex circumstance.

Here, we extensively examined the testimony of Russo, CSI's fire-origin expert, and determined that he relied upon sound data and methodology in determining the location where the fire started. Subsequent experts investigated possible causes for the fire in that location and testified, in Owen's case, that the fire did not have a mechanical or electrical origin, and in Armstrong's case, that it had a chemical origin. The context of their opinions--that they were asked to investigate potential causes for the fire that the fire-origin expert pin-pointed as starting in a particular location--was presented to the jury. Because we have determined that Owen's and Armstrong's opinions regarding potential causes for the fire in the hot box were based on reliable data and methodology, the jury was entitled to rely on them for that stated purpose.¹⁰ The dissent specifically argues that Armstrong was not reliable because he "simply assum[ed] that the correct location had been identified for the location of the [*81] fire and confin[ed] his analysis to the restricted universe of factors existing inside of the hot box. . . . His assumption did not permit a conclusion that no cause existed inside the box." Slip Op. at 28-29. However, as we have already discussed, Armstrong was not retained to identify the location where the fire originated, nor did he testify concerning the location of the fire's origin. He concluded that the fire started in the hot box due to the ignition of flammable vapors; and the nature of his testimony, as we related in our review of his testimony above, was that he did consider multiple possibilities in reaching his opinion, including the possibility that there was no chemical cause of the fire.

10 The jury was likewise free to disbelieve CSI's experts and to credit the testimony of Gharda's experts on fire-origin and causation. However, given the jury's findings on these questions, the jury chose to credit the testimony of Russo and Armstrong. See *City of Keller v. Wilson*, 168 S.W.3d 802, 822 (Tex. 2005) (holding, in "no-evidence" review, that we view evidence in light most favorable to verdict, crediting favorable evidence if reasonable jurors could and disregarding contrary [*82] evidence unless reasonable jurors could not).

Likewise, Cheremisinoff was asked to testify regarding the source of the contamination that Armstrong testified was present in the drums of chlorpyrifos. We con-

cluded that Cheremisinoff used sound data--data he obtained from Gharda itself and known scientific principles--and sound methodology in examining and answering the question he was retained to answer, namely, what was the origin of the contamination in the chlorpyrifos?

The dissent also argues that CSI's experts did not do sufficient testing. However, CSI's experts testified that they completed all of the testing that was possible under the circumstances of this case. Regarding the 3M badge tests, the dissent states that "No testing was conducted to confirm the reliability of [Russo's] method of collecting samples, which consisted of placing charcoal badges in the barrels nearly two weeks after the fire." Slip Op. at 29. The dissent also cites the fact that the badge tests showed a "greater amount of toluene, a contaminant that was not used in Gharda's production of chlorpyrifos" and that "[n]o testing was performed to determine whether the EDC, like the toluene, could have been detected [*83] because it was present in the air at the location of the warehouse" Slip Op. at 29-30. These arguments do not take Russo's and Armstrong's testimony on the subject into account. Russo and Armstrong both testified that charcoal badge testing was the commonly accepted method for testing the chemical vapors present, especially in situations where, as here, the actual chemicals themselves have been completely destroyed by the fire. Russo further testified that he and the other experts and fire investigators determined that using the badge tests was the proper method for investigating the types of chemicals that were present in the hot box because of the nature of the damage caused by the fire. Russo stated that any testing of scrapings from the insides of the drums would have involved heating the scrapings to release their vapors and to register the vapors on a charcoal badge, and, thus, the charcoal badges placed inside the drums themselves served the same purpose. No expert or other evidence contradicted Russo's testimony that this was a scientifically common method for testing under these circumstances.

Additionally, Russo testified that the experts were able to distinguish between [*84] chemicals and vapors that were present in the environment from chemicals and vapors that came from the contents of the drums themselves because, in analyzing these results, the experts looked at chemicals that showed up in roughly equal amounts across all of the badges. Russo testified that vapors from the environment would be present in approximately equal amounts in all of the badges, while spikes of chemicals that appeared only in certain drums indicated something that came from a particular drum. Russo and Armstrong both testified that this was scientifically reliable and a common testing method, and no expert or other evidence indicated that this was not a scientifically reliable methodology. Armstrong testified that

the higher levels of toluene that were present in a few of the barrels was a by-product of the decomposition of the contaminated chlorpyrifos and, based on Gharda's own information regarding the composition and manufacture of the chlorpyrifos, that the higher levels of EDC detected in a few of the barrels had to be the result of contamination, because EDC should not have been a part of the manufacturing process, and it was not present in all of the other barrels, [*85] indicating that it was not an environmental contaminant. Regarding the assertion that CSI failed to test the samples of the chlorpyrifos retained by Gharda, we observed that Gharda's experts tested the retains and presented the results to the jury, and CSI's expert Cheremisinoff testified regarding why the results from the testing of the retains did not establish that the chlorpyrifos was uncontaminated. Specifically, Cheremisinoff testified that Gharda's methods for collecting the retains from only one layer of the chlorpyrifos meant that any contaminants that had stratified into different layers would not be included in the sample.

The dissent argues that Cheremisinoff "did not test his theory that the Gharda manufacturing process could result in EDC contamination" and that Armstrong "did not test his theory that chlorpyrifos contaminated with EDC could spontaneously ignite under the conditions that CSI created in its hot box." Slip Op. at 30. There is no legal or scientific requirement that an expert witness test a generally accepted scientific theory for its reliability, and the dissent cites no authority for this claim. Cheremisinoff relied upon other information he received from [*86] Gharda itself about its manufacturing and quality control processes, physical evidence and forensic samples available after the fire, and the testing of the retains, to opine that the flaws in Gharda's manufacturing and quality control processes made it "quite possible, well within scientific certainty," that manufacturing flaws led to contamination of the chlorpyrifos at the plant. No expert or other evidence suggested any other, more scientifically reliable method for determining or testing for contamination that occurred in the past in a batch of chemicals that was destroyed by a fire. Armstrong testified that no one could attempt to recreate the explosion that occurred in the hot box on a small scale because changes in quantities and pressures would affect the ultimate results, but he relied on known, well-established scientific principles and chemical properties in reaching his conclusions about how ignition occurred. No other expert or evidence indicated that his reasoning was scientifically unsound or that the principles and properties that he relied upon were unsound.

The dissent compares the present case to *Whirlpool Corp. v. Camacho*, reasoning that the following factors of [*87] this case are comparable to those present in *Whirlpool*: (1) the lack of testing; (2) the fact that "CSI's

experts' theories were 'developed for the litigation [in this case]'" and were not "published in any scientific journal, treatise, or publication so they could be subjected to peer review"; and (3) CSI's experts failed to "indicate that all of the relevant theories had been accepted as valid by relevant scientific or expert communities." Slip Op. at 31-32. We disagree that this case is comparable to *Whirlpool*.

In *Whirlpool*, the Camachos sued Whirlpool under a design-defect cause of action, asserting that Whirlpool's use of a corrugated tube in a clothes dryer's air-circulation system was a design defect that allowed the tube to become clogged and caused lint to be discharged into the dryer where it was ignited by the heater element and caused a fatal fire. 298 S.W.3d at 634. The Camachos presented the testimony of one expert witness as their only evidence of a design defect. *Id.* at 635. The expert opined that the corrugated tube allowed lint to clog it and that excessive amounts of lint escaped into the dryer cabinet, where the smoldering lint particles ignited the clothes in the [*88] dryer drum. *Id.* He based his opinion on pretrial statements made by the plaintiff that she saw flames coming from the dryer, on the comparison to a corrugated lint tube that was used under vastly different conditions than the one in the Camachos' dryer, and on a Consumer Product Safety Commission report ("CPSC report") that analyzed lint-ignition characteristics in a dryer that was configured differently from the Camachos' dryer. *Id.* at 640-41.

The supreme court stated that the expert "had not seen or read of a test showing that a corrugated lint transport tube in a dryer properly vented as the Camachos' was, would become clogged with lint to the extent it backed lint up into the blower assembly. He did not personally test his theory. Nor did he test his theory that the lint would be blown through the lint chute seal if the lint transport tube became clogged." *Id.* at 640. In contrast, the court observed that Whirlpool presented uncontested expert testimony and test results showing that any particles of lint that could pass through the inlet grill of the Camachos' dryer would be much smaller than those in the CPSC report; that even if larger pieces could escape, they could not become [*89] airborne inside the dryer cabinet; and that lint small enough to pass through the small openings in the inlet grill would self-extinguish and would not have ignited clothing in the drum. *Id.* at 640-41. The court stated, "While we do not decide whether Whirlpool's evidence conclusively proved that Clayton's opinions were invalid, we note that the evidence, including the CPSC report relied upon by [the Camachos' expert] highlights the extent to which [the expert's] theory was subject to testing and examining for reliability." *Id.* at 642. The court further observed that the expert testimony left significant analytical gaps: he

did not explain what size particles he believed could have remained airborne and drawn into the heater box or test or otherwise calculate the maximum size of such particles; he did not determine and did not know the length of time it took various size particles to self-extinguish or how much heat was generated by the particles; he did not testify about how ignited lint particles small enough to pass through the inlet grill could survive and smolder inside tumbling clothes; and he did not explain how the CPSC report's testing data supported his conclusions. *Id.*

The [*90] instant case is distinguishable from these facts. Here, CSI's expert testimony established that the experts relied upon generally accepted scientific methodologies and completed all of the testing that was feasible for them to complete. *See id.* ("[L]ack of *relevant testing to the extent it was possible*, either by the expert or others, is one factor that points toward a determination that an expert opinion is unreliable.") (emphasis added). "If testing of critical aspects of an expert's testimony has not taken place either by the expert or others in the relevant scientific or expert community, then an explanation of why it has not is an important consideration in evaluating the expert opinions and determining whether they are substantively more than merely the expert's conclusory, subjective opinion." *Id.* at 642-43.

Here, Russo testified that the charcoal badge tests filled essentially the same function as testing the burned residue, or "coke," from inside the drums and that, as a result of the fire, there was no other material that could have been tested. Russo and Armstrong both testified that the use of badge tests were the scientifically-accepted method for testing vapors in cases [*91] like this. Armstrong's and Cheremisnoff's testimony was based on tests completed by other scientists regarding the decomposition temperatures and rates of chlorpyrifos and the flammability and ignition rates of vapors like EDC and toluene, including using some information that came from Gharda's own materials. Gharda itself tested the retained samples and presented that evidence to the jury. Armstrong testified that he could not recreate the conditions that led to the explosion and fire on a smaller scale because exact quantities and pressures were required to recreate the same result. Thus, unlike the expert in *Whirlpool*, there was evidence here that CSI's experts all relied on generally accepted scientific principles and that they conducted relevant testing to the extent it was possible or that they relied on testing done by others. *See id.* at 642. To the extent that testing was not possible, CSI's experts provided an explanation of why it was not done. *See id.* at 642-43. Furthermore, unlike Whirlpool's own extensive testing that served to "highlight[] the extent to which [the expert's] theory was subject to testing

and examining for reliability," Gharda has presented no such evidence. [*92] *See id. at 642.*

In *Whirlpool*, the supreme court looked at other factors in addition to the lack of testing, observing that the expert's opinion was developed for the litigation in that case. *See id. at 643* (citing *Robinson*, 923 S.W.2d at 559 ("[O]pinions formed solely for the purpose of testifying are more likely to be biased toward a particular result.")). It also observed that the expert's opinions and theory had not been published or subjected to peer review. Here, in contrast, Russo, Owen, and Armstrong were retained to investigate the origin of the fire, and they then testified about the results of their investigation. Russo, in particular, was retained to investigate just a few days after the fire occurred, and he, in turn, sought the input of Owen and Armstrong. Unlike *Whirlpool*, in which the Camachos' expert reached a different conclusion than the fire marshal, here Russo and Rice, the fire marshal who investigated the fire on behalf of Harris County, both reached the same conclusions regarding the origin of the fire. *See id. at 634.* Likewise, while none of the expert's investigations and conclusions regarding this particular fire were published, their opinions were based on [*93] scientific principles, such as the known properties of various chemicals, or other standards, such as NFPA 921, ASTM E1618, or information from Gharda's own scientists and research, that have been repeatedly published and subjected to peer review.

Thus, we conclude that the expert testimony of Russo, Rice, Armstrong, and Cheremisinoff was reliable and constituted some evidence that could have properly been considered by the jury.

C. Evidence Supporting the Jury's Negligence, Product Defect, and Causation Findings

We further hold that, with this testimony, CSI presented more than a scintilla of evidence on each of the elements of product defect, negligence, and causation. Therefore, the trial court erred in disregarding the jury's answers to Questions One, Two, and Sixteen and in entering JNOV based on CSI's failure to prove these elements essential to Gharda's liability. *See TEX. R. CIV. P. 301; Tiller*, 121 S.W.3d at 713; *M.N. Dannenbaum, Inc.*, 840 S.W.2d at 629.

A manufacturing defect exists when a product deviates, in its construction or quality, from the specifications or planned output in a manner that renders it unreasonably dangerous. *Ford Motor Co. v. Ridgway*, 135 S.W.3d 598, 600 (Tex. 2004). [*94] A plaintiff must prove that the product was defective when it left the hands of the manufacturer and that the defect was a producing cause of the plaintiff's injuries. *Id.* To prove a negligence cause of action, a plaintiff must show that the defendant

breached a duty that was owed to the plaintiff and that the breach proximately caused the plaintiff's injury. *W. Invs., Inc. v. Urena*, 162 S.W.3d 547, 550 (Tex. 2005).

1. Causation

In its first issue, CSI argues that the circumstantial evidence of causation was sufficient even without an expert opinion on causal mechanism. In its third issue, CSI argues that the trial court erred by disregarding the jury's negligence finding because sufficient evidence exists to support the verdict without expert causation testimony.

Because we have held that Gharda failed to show that any of the expert testimony was unreliable as a matter of law, and, therefore, the jury could have considered this testimony to support its verdict, we conclude that the jury's answers to Questions One, Two, and Sixteen, regarding a defect in the chlorpyrifos, negligence, and causation, were supported by more than a scintilla of evidence.

Russo testified that the fire originated [*95] in the hot box, and Armstrong testified that the explosion and resulting fire was caused by the spontaneous ignition of flammable vapors. Armstrong testified that the vapors were the result of the rapid decomposition of the chlorpyrifos that was caused by a contaminant, EDC, contained in the chlorpyrifos. Cheremisinoff testified that the flaws in the manufacturing and quality control processes at Gharda made it "quite possible, well within scientific certainty, that there are manufacturing flaws" that led to contamination of the chlorpyrifos at the plant. Thus, there was sufficient evidence to support the jury's conclusion that Gharda's negligence resulted in contamination of the chlorpyrifos and that the contaminated chlorpyrifos was the cause of the fire and explosion that destroyed CSI's warehouse. It is therefore unnecessary to look for further evidence of causation to support the jury's conclusion.

We sustain CSI's first and third issues.

2. Marketing Defect

In its second issue, CSI argues that the trial court erred in entering a take-nothing judgment because its JNOV did not encompass the jury's findings on a marketing defect against GUSA.¹¹

¹¹ GUSA argues that CSI waived any complaint [*96] about this error because it failed to argue in the trial court that the marketing-defect verdict was not included in the JNOV. However, CSI filed an amended motion for judgment on April 23, 2010, seeking, in part, entry of judgment on the jury's findings regarding a marketing defect.

See Emerson v. Tunnell, 793 S.W.2d 947, 948 (Tex. 1990) (holding that appellant preserved complaint that trial court erred in amount of judgment entered by filing motion for judgment on jury's verdict, stating that appellant "presented a motion to the trial court for judgment for a quantum meruit measure of recovery based upon the jury verdict" and that "[h]e obtained an adverse ruling from the trial court when it granted him judgment for an amount less than he requested").

A defendant's failure to warn of a product's potential dangers when warnings are required is a type of marketing defect. *Caterpillar, Inc. v. Shears*, 911 S.W.2d 379, 382 (Tex. 1995). A defendant can be held liable when the lack of adequate warnings or instructions renders an otherwise adequate product unreasonably dangerous. *Id.*

The marketing-defect claim in this case depended on proof that the chlorpyrifos caused the fire or was unreasonably [*97] dangerous, which depended on the expert testimony addressed above. The jury concluded that the warning or instruction provided with the chlorpyrifos was inadequate and that the inadequacy resulted in CSI's damages. Because we have already concluded that CSI's expert testimony was reliable and constituted some evidence of the origin and cause of the fire, the jury's findings on the marketing-defect claim are likewise supported by the record. Thus, the trial court erred in granting JNOV on this ground.

We sustain CSI's second issue.¹²

12 CSI also argues, in the alternative, that error in the admission of expert testimony requires a new trial, rather than a rendition of JNOV, as the trial court did here. Because of our previous holdings, we do not address this argument.

JURY'S AWARD TO MARK BOYD

In its fourth issue, CSI argues that the trial court erred by disregarding the jury's award to Mark Boyd to compensate him for the destruction of the warehouse, that the trial court's post-verdict rendition of summary judgment against Boyd was improper, and that Boyd's claim was the correction of a misnomer and did not implicate the statute of limitations because the amended pleading adding him as [*98] the building's owner/lessor related back to CSI's original petition.

Gharda moved for summary judgment pre-trial, arguing that CSI was not the owner of the warehouse and, therefore, it lacked the capacity to sue for damages to the actual real property. Accordingly, CSI amended its petition to add Mark Boyd, president of CSI, as the owner/lessor. Gharda subsequently argued that Boyd's

claims, as added in the amended petition, were barred by the statute of limitations.

A party moving for summary judgment on the basis of limitations must conclusively establish the bar of limitations. *Jennings v. Burgess*, 917 S.W.2d 790, 793 (Tex. 1996). Thus, the movant must conclusively negate any relevant tolling provision the non-movant asserted in the trial court. *See id.*

Generally, "an amended pleading adding a new party does not relate back to the original pleading" to determine whether it is timely to avoid limitations. *Univ. of Tex. Health Sci. Ctr. at San Antonio v. Bailey*, 332 S.W.3d 395, 400 (Tex. 2011) (quoting *Alexander v. Turtur & Assocs., Inc.*, 146 S.W.3d 113, 121 (Tex. 2004)). However, "[m]isnomer is an exception . . ." *Id.* Misnomer arises when the plaintiff misnames itself or the correct [*99] defendant. *Enserch Corp. v. Parker*, 794 S.W.2d 2, 4 (Tex. 1990); *see also Chilkewitz v. Hyson*, 22 S.W.3d 825, 828 (Tex. 1999) ("Misnomer arises when a plaintiff sues the correct entity but misnames it.").

Misnomer cases are analyzed by examining whether (1) a judgment under the original pleading would bar recovery under the amended pleading; (2) the same evidence supports both of the pleadings; (3) the measure of damages is the same in both pleadings; and (4) the allegations in both pleadings are subject to the same defenses. *Foust v. Estate of Walters ex rel. Walters*, 21 S.W.3d 495, 501 (Tex. App.--San Antonio 2000, *pet. denied*). "When a party is misnamed, but no one has been misled or disadvantaged by the error in the pleading, the relation-back doctrine operates to preserve the claim against the bar of limitations." *Id.* (citing *Dougherty v. Gifford*, 826 S.W.2d 668, 677 (Tex. App.--Texarkana 1992, *no writ*) and *Palmer v. Enserch Corp.*, 728 S.W.2d 431, 434 (Tex. App.--Austin 1987, *writ ref'd n.r.e.*)). "If the nature of the suit against the defendants remains unchanged, the substitution of parties-plaintiff does not constitute a new suit." *Id.* (citing *Vaughn Bldg. Corp. v. Austin Co.*, 620 S.W.2d 678, 682 (Tex. Civ. App.--Dallas 1981), [*100] *aff'd*, 643 S.W.2d 113 (1982) and *Medford v. Red River Cnty.*, 84 S.W.2d 345, 352 (Tex. Civ. App.--El Paso 1935, *no writ*)).

Here, a portion of CSI's original petition misnamed CSI as the owner of the building that was destroyed in the fire. CSI subsequently amended its petition to name its president, Boyd, as the owner and lessor of the building. This amendment did not add a new claim or a new claimant and it did not increase the potential liability Gharda faced--it merely renamed the owner of the property as Boyd rather than CSI. Thus, CSI and Boyd did not both seek damages simultaneously for destruction of the building; the same evidence supported both plead-

ings; the measure of damages was the same in both pleadings; and the allegations in both pleadings were subject to the same defenses. *See Foust, 21 S.W.3d at 501*. No party was misled or disadvantaged by the error in the pleading, and the nature of the suit against Gharda remained unchanged after CSI's amendment of its suit. *See id.*

Thus, we conclude that the trial court erred in rendering summary judgment in favor of Gharda based on its argument that Boyd's claims were barred by the statute of limitations.

We [*101] sustain CSI's fourth issue.

GHARDA'S CROSS POINTS

A. Proper Disposition of the Case

Gharda and GUSA argue that if we determine the expert testimony was reliable and supported the jury's verdict--as we have already concluded--we must reverse and remand rather than render judgment on the verdict. Specifically, they argue that admission of Armstrong's, Cheremisinoff's, Rice's, and Russo's testimony was harmful error.

However, we have already concluded that the trial court's determinations that the experts were reliable, both pre-trial during the *Daubert/Robinson* hearings and during the trial itself, were proper and that the trial court erred in concluding after the trial that the experts' testimony had constituted no evidence and in entering JNOV. Gharda has failed to show that admission of CSI's expert testimony was harmful error.

We overrule this cross point.

B. Sufficiency of the Evidence of Damages

Gharda and GUSA also argue that the evidence was insufficient to support CSI's damages, particularly the award of environmental cleanup costs, lost warehouse equipment, and lost profits. Specifically, they argue that the testimony of CSI's forensic accountant, Shannon Rusnak, was insufficient because [*102] she had no personal knowledge of the necessary construction or cleanup costs or of the fair market value of equipment or inventory.

Rusnak testified that she was a CPA employed as a forensic accountant with the firm Matson, Driscoll & Damico, a firm that specializes in economic-damage calculations, and that she was hired by CSI in March 2004 "to help evaluate the economic damages that arose from the fire." She testified that she interviewed several of the principals of CSI and third-party accountants and that she reviewed a "great deal of paperwork," including third-party invoices, asset registers, inventory records,

financial records, profit and loss statements, and sales records. Specifically, she testified that she "[r]eviewed boxes and boxes of documentation in order to verify the reasonableness of the claimed amounts that have been set forth today."

1. Damage to Warehouse

Gharda argues that CSI and Boyd were required to prove the fair market value of the warehouse because the building was a total loss. However, Boyd's and Rusnak's testimony established that the property was rebuilt to its former condition. Thus, CSI was entitled to recover the amount necessary to rebuild its facility [*103] and to compensate for its loss of use during the interim time period in an amount sufficient to place it in the same position it occupied prior to the fire. *See Coastal Transp., 136 S.W.3d at 235; see also Hall v. Hubco, Inc., 292 S.W.3d 22, 32 (Tex. App.--Houston [14th Dist.] 2006, pet. denied)* ("If repair is feasible and does not cause economic waste, then the plaintiff may recover the cost of repair; otherwise, the plaintiff is entitled to the decrease in market value caused by the injury."). CSI was not obligated to present evidence of fair market value to support the amount of damages awarded for destruction of the warehouse.

Boyd, CSI's president and the owner of the warehouse, testified that the actual cost to rebuild the warehouse was \$2.3 million. Rusnak testified that CSI incurred \$1,862,325 in damages to rebuild the warehouse. She based this calculation on estimates, research of market value of similar properties, and her experience, and the amount she provided was reduced to place Boyd in the same position he was in right before the fire.

Thus, the evidence was sufficient to support the jury's finding that "[t]he reasonable costs . . . to restore the building in question to [*104] the condition it was in immediately before the occurrence in question" were \$1.9 million.

2. Environmental Cleanup Costs

CSI introduced invoices for environmental cleanup through Boyd. Boyd testified that CSI incurred \$2.2 million in cleanup costs and provided invoices to support those damages. Rusnak testified that her review of the invoices paid by CSI for environmental cleanup totaled \$2,190,086 in damages. Gharda argues that neither Boyd nor Rusnak knew whether the charges paid by CSI were "reasonable or necessary." However, Rusnak testified that she specialized in determining economic damages and that she "[r]eviewed boxes and boxes of documentation in order to verify the reasonableness of the claimed amounts that have been set forth today." *See Mieth v. Ranchquest, Inc., 177 S.W.3d 296, 303 (Tex. App.--*

Houston [1st Dist.] 2005, no pet.) ("When an injury to land is temporary and can be remediated at reasonable expense, the proper measure of damages is the cost of restoration to its condition immediately preceding the injury.").

Thus, the evidence was sufficient to support the jury's award of \$2.1 million for the "[r]easonable and necessary costs for environmental cleanup."

3. Lost [*105] Warehouse Equipment

Gharda also argues that no evidence supported the jury's award of \$2.3 million for the difference in market value of CSI's contents of the warehouse immediately before and immediately after the fire. Specifically, Gharda argues that there is no evidence to support the jury's finding that CSI was entitled to \$993,000 for warehouse equipment. However, the jury's verdict did not segregate the amount of its award according to inventory or warehouse equipment. It awarded one lump sum for all of CSI's "contents" of the warehouse.

Generally, the measure of damages to personal property is "the difference in its market value immediately before and immediately after the injury, at the place where the damage occurred." *Thomas v. Oldham*, 895 S.W.2d 352, 359 (Tex. 1995); *Yazdani-Beioky v. Tremont Tower Condo. Ass's, Inc., No. 01-10-00107-CV*, 2011 Tex. App. LEXIS 2763, 2011 WL 1434837, at *5 (Tex. App.--Houston [1st Dist.] April 14, 2011, no pet.) (mem. op.). Market value is defined as the amount that a willing buyer, who desires to buy but is under no obligation to buy, would pay to a willing seller who desires to sell but is under no obligation to sell. *Yazdani-Beioky*, 2011 Tex. App. LEXIS 2763, 2011 WL 1434837, at *5 (citing *City of Pearland v. Alexander*, 483 S.W.2d 244, 247 (Tex. 1972)). [*106] However, not all property has a "market value," and, in situations where a market value does not exist, such as for used household items, "replacement value is the means of assessing damages." *Id.* (citing *Gulf States Utils. Co. v. Low*, 79 S.W.3d 561, 569 (Tex. 2002)).

When replacement costs would represent an economic gain to a plaintiff whose property has been destroyed, the measure of damages is "the actual worth or value of the articles to the owner for use in the condition in which they were at the time of the [incident] excluding any fanciful or sentimental considerations." *Crisp v. Sec. Nat'l Ins. Co.*, 369 S.W.2d 326, 328 (Tex. 1963); *Yazdani-Beioky*, 2011 Tex. App. LEXIS 2763, 2011 WL 1434837, at *5. In determining actual value, a factfinder "may consider original cost and cost of replacement, the opinions upon value given by qualified witnesses, the gainful uses to which the property has been put, as well as any other facts reasonably tending to shed light on the

subject." *Crisp*, 369 S.W.2d at 329; *Yazdani-Beioky*, 2011 Tex. App. LEXIS 2763, 2011 WL 1434837, at *5. The factfinder has discretion to award damages within the range of evidence presented at trial. *Yazdani-Beioky*, 2011 Tex. App. LEXIS 2763, 2011 WL 1434837, at *5 (citing *Gulf States Utils.*, 79 S.W.3d at 566).

It [*107] is undisputed that, as a result of the fire, CSI lost all of the inventory and equipment contained in the warehouse. Howard Stoddard, a CSI employee, provided invoices showing the amount paid for the inventory lost in the fire and invoices showing the purchase price of the equipment. The invoices he provided indicated that CSI had lost equipment costing approximately \$929,000. Rusnak calculated that CSI lost \$1,308,432 in inventory. Rusnak further testified that she reviewed the list of warehouse equipment and verified the equipment actually lost in the fire, reviewed original purchase prices, and factored in depreciation to determine that the lost equipment resulted in a loss of \$851,488.

Thus, the jury's award of \$2.3 million for CSI's lost warehouse contents was within the range of the evidence presented at trial.

4. Lost Profits

Finally, the jury was asked to assess damages for CSI's "reasonable and necessary extra production costs" and for "lost profits." The jury awarded \$950,000 for extra production costs and nothing for lost profits. Gharda argues that extra production costs are a component of lost profits and that the questions should not have been presented to the jury separately. [*108] Gharda objected to the testimony on extra production costs and to the submission of a separate jury question on that issue.¹³

13 Although Gharda points out that it objected to this form of the jury charge, it does not present this argument in the context of charge error, but only as sufficiency of the evidence to support CSI's damages. Thus, to the extent that Gharda intended to argue charge error, that issue is waived for lack of briefing. *See TEX. R. APP. P. 38.1(i)*.

Gharda cites *Springs Window Fashions Division, Inc. v. Blind Maker, Inc.*, 184 S.W.3d 840 (Tex. App.--Austin 2006, pet. granted, judgm't vacated w.r.m.). In *Springs Window*, the Austin Court of Appeals stated:

[L]ost profits, by definition, must be *profits*, and should not be confused with economic gains or losses that are a mere component of lost profits calculation or with other types of economic harm that

may be compensable though different damage elements. Lost profits are damages for the loss of *net* income to a business, and, broadly speaking, reflect[] income from lost business activity less expenses that would have been attributable to that activity.

Id. at 884 (emphasis in original) (citing *Holt Atherton Indus. Inc. v. Heine*, 835 S.W.2d 80, 84 (Tex. 1992) [*109] (evidence of "lost income" does not constitute evidence of lost profits)).

CSI argues, however, that the extra production costs it incurred as a result of needing to outsource production to third parties and needing to process chemicals in smaller amounts due to the damage to its bulk tank were separate economic injuries from lost profits. Stoddard testified that CSI's increased production costs totaled \$953,000. Rusnak testified that CSI incurred \$953,588 in damages as a result of extra production costs. She testified that she arrived at this calculation by looking at "the incremental cost, what it cost [CSI] to send that product to the third party in order to get it processed versus what it would have cost them internally to do in-house in terms of the raw material and repackaging." She also testified that this amount was "offset against any lost revenues" and that "there's no duplication between the two."

Thus, Stoddard's and Rusnak's testimony supports the jury's finding that CSI suffered a loss of \$950,000--distinct from lost profits--as a result of increased production costs.¹⁴

14 We also note that, although Gharda makes the general statement that CSI's damages were not supported by [*110] the evidence, it did not provide any specific record references, argument, or citation to authority regarding the jury's findings for the contents of the office building or bulk tank repairs. Nor did Gharda challenge the findings regarding UPI's damages. Thus, any complaint on these issues is waived for lack of briefing. See *TEX. R. APP. P. 38(i)*.

We overrule this cross point

GUSA'S CROSS POINTS: DAMAGES LIMITS

GUSA argues that, if we sustain one or more of CSI's issues, its liability, if any, is limited by contract to CSI's purchase price for the chlorpyrifos--\$110,000--pursuant to *Texas Business and Commerce Code section 2.719(a)(1)*. GUSA raised this issue in a pre-trial motion for summary judgment on the limitation of damages,

which was denied by the trial court. GUSA did not present this argument again following the judgment on the merits or in any of its post-trial motions.

GUSA asserts that the chlorpyrifos it sold to CSI contained a disclaimer implicating *Texas Business and Commerce Code section 2.719(a)(1)*. The label stated,

Any damages arising from breach of warranty or negligence shall be limited to direct damages not exceeding the purchase price paid for this product by Buyer, [*111] and shall not include incidental or consequential damages such as, but not limited to, lost profits or values. . . . In no case shall Seller be liable for the consequential, special or indirect damages resulting from the use or handling of this product.

GUSA argues that the purchase price for the chlorpyrifos was \$110,000. The disclaimer was not part of the purchase-order contract between CSI and GUSA.

Section 2.719 allows for contractual modification or limitation of remedies between parties to an agreement for a sale of goods. It states:

(a) Subject to the provisions of Subsections (b) and (c) of this section and of the preceding section on liquidation and limitation of damages,

(1) the agreement may provide for remedies in addition to or in substitution for those provided in this chapter and may limit or alter the measure of damages recoverable under this chapter, as by limiting the buyer's remedies to return of the goods and repayment of the price or to repair and replacement of non-conforming goods or parts; and

(2) resort to a remedy as provided is optional unless the remedy is expressly stated to be exclusive, in which case it is the sole remedy.

(b) Where circumstances cause an exclusive [*112] or limited remedy to fail of its essential purpose, remedy may be had as provided in this title.

(c) Consequential damages may be limited or excluded unless the limitation or exclusion is unconscionable. Limitation of consequential damages for injury to the person in the case of consumer goods is prima facie unconscionable but limitation of damages where the loss is commercial is not.

TEX. BUS. & COM. CODE ANN. § 2.719 (Vernon 2009)

This section applies to damages between a buyer and a seller for breach of contract. *See id.*; *see also id.* § 2.102 (Vernon 2009) (providing scope of UCC and stating that chapter applies to transaction in goods); *id.* § 2.701 (Vernon 2009) (providing that "[r]emedies for breach of any obligation or promise collateral or ancillary to a contract for sale are not impaired by the provisions of this chapter"). GUSA has presented no authority that we should apply *section 2.719* to CSI's claims for negligence and marketing defect, as the cases cited by GUSA are all breach of contract or breach of warranty causes of action.

We overrule this cross point.

CONCLUSION

We overrule the cross points of Gharda and GUSA. We reverse the judgment of the trial court and remand for [*113] the trial court to enter judgment on the jury verdict in favor of CSI, United Phosphorus, and Mark Boyd.

Evelyn V. Keyes

Justice

Panel consists of Justices Keyes, Higley, and Massengale.

Justice Massengale, dissenting.

DISSENT BY: Michael Massengale

DISSENT

DISSENTING OPINION

I respectfully dissent. CSI's case depended heavily on a series of interdependent expert opinions, none of which was sufficient on its own to support a conclusion that the cause of the fire was a spontaneous ignition of fumes occurring due to EDC contamination in chemical

products marketed and sold by the Gharda entities. More importantly, even taken together, the expert opinions did not rest upon a reliable basis sufficient to justify their admission into evidence. The district court correctly concluded that these opinions could not support the jury's verdict. Even if the remaining factual circumstantial evidence were sufficient to support a conclusion that the fire was started by some defect in the Gharda product, there was no evidence to demonstrate what that defect was, how it came about, or who was responsible for it. Accordingly, I would affirm the district court, which correctly rendered a take-nothing judgment.

I. [*114] Supplemental background

The majority opinion advocates for the admissibility of the challenged expert opinions without adequately acknowledging and addressing the arguments about their deficiencies. To put the issues presented in their proper context, the following summary provides additional detail about the key expert opinions at issue and the criticisms interposed by the Gharda entities.

A. Sammy Russo, fire investigator

CSI describes Sammy Russo as its "fire origin expert." His background and qualifications as a fire investigator are not at issue in this appeal, but the reliability of his methodology and resulting opinions are. After CSI's trial counsel had already preliminarily determined and informed Gharda that "container drums of Chlorpyrifos Technical, manufactured and/or distributed by Gharda USA . . . were located in the probable location of the fire's origin and may have been the cause of the fire," the same lawyers hired Russo, who subsequently made his first visit to the CSI facility six days after the fire without actually entering the facility at that time. He first physically entered the facility during his second visit, nine days after the fire. During that inspection, [*115] Russo wore a full-body protective suit to avoid exposure to chemicals on the premises.

Russo claimed to use a methodology known as NFPA 921 to perform his investigation.¹ Despite being referenced repeatedly at trial and in the parties' briefing, a copy of NFPA 921 does not appear to have been made part of the appellate record. It was fundamentally CSI's burden to demonstrate that its proffered expert opinion testimony rested upon a reliable basis. *See E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549, 556 (Tex. 1995).² Based on various observations, Russo developed a hypothesis that the fire started in the southwest quadrant of the building, where the hot box was located.³ The factors that he said led to his hypothesis included the general location of the fire's origin as indicated by helicopter news video footage, reports from firefighters who entered the northwest quadrant and reported fire to their

right, fire patterns leading away from the hot box and the absence of fire patterns leading toward the hot box, damage to the hot box including doors and hinges which appeared to have been "blown open" or "pushed open,"⁴ a "V" burn pattern on the wall behind the hot box, and the [*116] appearance that three drums inside the hot box looked different than the others and showed signs of very hot burning.

1 In a general sense, NFPA 921 has been accepted by many courts as a scientifically reliable methodology for investigating the cause and origin of a fire. *See, e.g., Proffitt v. State, No. 01-02-00692-CR, 2003 Tex. App. LEXIS 9522, 2003 WL 22512074 (Tex. App.--Houston [1st Dist.] Nov. 6, 2003, pet. ref'd)* (mem. op.). *See generally* 5 DAVID L. FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY § 39.9 (2011-2012 ed.); REPORT OF THE TEXAS FORENSIC SCIENCE COMMISSION: WILLINGHAM/WILLIS INVESTIGATION, at 14 (2011) (hereinafter, WILLINGHAM REPORT), available at <http://www.fsc.state.tx.us/documents/FINAL.pdf> (recognizing NFPA 921 as expressing the "contemporary standard of practice").

2 It is also CSI's burden as appellant to bring us a complete record supporting its request that we reverse the judgment of the trial court based upon our de novo review of the trial court's rendition of a JNOV. The relevant text of NFPA 921 was made available to the trial court, but it has not been provided to us, which makes it difficult to conclude, as the majority has, that Russo complied [*117] with NFPA 921 in its material particulars so as to provide a reliable basis for his opinions. CSI relies on Russo's assertion that he followed NFPA 921 as support for the supposed reliability of his method, but, as acknowledged by the panel majority, the Gharda entities disputed whether Russo's method actually adhered to the guidelines of NFPA 921. The majority nevertheless accepts and relies upon Russo's assertions that he actually followed NFPA 921's procedures, despite the fact that the record contains no basis upon which the majority could make that determination de novo. In particular, the majority entirely fails to address one of the criticisms of Russo's supposed adherence to NFPA 921: the requirement that a hypothesis about the location of a fire's origin be confirmed by identification of an ignition source before an opinion can be reliably formed about cause and origin.

3 In its appellate brief, CSI characterized Russo's opinion at trial more broadly, stating that his

opinion was that "the physical evidence was consistent with a low-order explosion within the hot box from an ignitable vapor, and fire originating from the hot box in the southwest quadrant of the building." The [*118] record citations provided in support of this characterization confirm only that Russo claimed to follow the guidelines of NFPA 921, that he opined that "[e]verything that [he] looked at [was] consistent with it being a very low order pressurization of the box . . . that's consistent with the damage that's here," and that there was a "fire that emanated from the hot box and went to other areas of the building." At the pretrial *Robinson* hearing, Russo affirmatively disclaimed offering an opinion about the cause of the fire--he confined his proposed opinion only to the location of its origin. He specifically stated, "I don't think I was tendered to render a cause. I was tendered to render an origin."

4 Russo testified at trial: "Once I saw the hot box, I saw that the hinges had been -- and I'm going to use the term 'blown open,' but they're pushed open. Okay? That's a more accurate description."

As described by Russo, the NFPA 921 investigation procedure contemplates the development of a preliminary hypothesis that must then be evaluated to "ensure it has scientific merit." Russo specifically agreed that in order to test his hypothesis, he would need "some testing that would show under the [*119] circumstances involved, whatever was in this barrel would be something that could be a source of an ignitable vapor." After the hypothesis had been tested, then an opinion of fire origin and cause could be developed.⁵

5 Relevant portions of NFPA 921 quoted during the *Robinson* hearing confirm these aspects of the protocol. The quoted portions of NFPA 921 provide that the determination of the cause of a fire "requires the identification of those circumstances and factors that were necessary for the fire to have occurred," including but not limited to the "presence of a competent ignition source, the type and form of the material first ignited and the circumstances or human actions that allowed the factors to come together."

Russo did not affirmatively testify that any scientific analysis performed by him led to or confirmed a conclusion that a "low-order explosion within the hot box from ignitable vapor" either happened or was even physically possible. Instead, to confirm those conclusions, Russo suggested that additional experts be engaged. He specifically recommended that an electrical engineer be engaged to inspect electrical components removed from the

hot box for mechanical or electrical [*120] malfunction.⁶ The electrical engineer retained by CSI's trial counsel for this purpose concluded that whatever might have ignited a fire in the hot box, it was not an electrical or mechanical source. Therefore, still another opinion was required to explain how the fire could have started inside the hot box.

6 The engineer presented as CSI's witness to inspect for mechanical or electrical malfunction was Roger Owen. Owen testified that "[i]t was pretty obvious that you had a fire in the oven," and his task was to determine whether the cause was "electrical or mechanical or something else."

B. Dr. Andy Armstrong, chemist

Another one of the supplemental experts suggested by Russo was chemist Dr. Andy Armstrong. Russo's objective in recruiting Dr. Armstrong was described by CSI as being "to determine a testing protocol because there was no product left in the drums to test post-fire."⁷ The "protocol" developed by the experts hired by CSI's counsel involved taking the empty Gharda drums and placing them--13 days after the fire--into "overpacks" containing a charcoal badge⁸ designed to capture materials present in the air.⁹ In his deposition, Dr. Armstrong admitted that the vapors collected by [*121] the badge test could have come from a number of sources, including the decomposition of the Gharda product (the chlorpyrifos technical), byproducts of the fire, and the surrounding air in the area of the Houston Ship Channel. At trial, Russo described the testing as follows:

... When you have a coat type of material, it tends to absorb chemicals. So what we did was take each drum out individually out of the hot box.

We developed a numbering system from left to right, TF-1 being top front 1. It's not a -- you know, we used the most complicated thing for us arson investigators.

And we took one drum at a time and we placed it into an overpack, which is a larger drum that will seal. We put the full contents of it, the bits and pieces of the drum, placed it in there. And on top of each drum, we had a charcoal canister. Charcoal absorbs hydrocarbons. It absorbs vapors.

These are sealed containers.

...

... [The charcoal canister has] got a layer of charcoal. It's got badge type of device in there. ... [I]t comes sealed. So there's no -- no contamination.

What we did was place a drum in the overpack, pull the seal. We did one sample at a time so we didn't run the risk of mixing up, you know, [*122] drums or containers. Labeled each one individually, popped the seal and put the -- put the lid on the overpack and allowed this to sit until we removed the samples from the overpack.

...

... [The] charcoal badge ... functions by passive absorption. When it's exposed to vapors -- chemically, vapors move from a higher concentration to, in this instance, no concentration or a lower concentration and it saturates the badge.

This is then subsequently removed and there is a little seal that you place over this and this is sent to a testing laboratory where they analyze the contents.

We didn't open these until we put them in the drum because we didn't want to sample the air space within the -- within the building. So we were very careful to do that -- this is the last step before we put the seal on the drum.

7 Although CSI's testing protocol was premised on the assertion that the experts had no other means to test the Gharda product, there were samples from several other sources that they chose not to investigate. There were burned remains found in some of the Gharda drums after the fire, but CSI's experts chose not to test those samples. The CSI experts also chose not to test for EDC contamination [*123] two unburned chlorpyrifos drums that came from the same shipment as those destroyed in the hot box. The Gharda entities tested the contents of those drums and found their EDC levels to be within product specifications. There were also retained Gharda samples from the same batch of chlorpyrifos, but CSI's experts chose not to test those, either. The Gharda entities' tests on those retained samples showed that none of the chlorpyrifos retains had excess EDC.

8 Dr. Armstrong explained that these "3M industrial hygiene exposure badges" were "basically a charcoal substrate that has a personnel monitor," derived "from the world of industrial hygiene where you would take it out of the container, pin it on your label and wear it all day to see what you're exposed to."

9 Both CSI and the majority suggest that the Gharda entities agreed to, cooperated with, or at least acquiesced in the testing "protocol" developed by Russo and Dr. Armstrong. There is no evidence that investigators at the site on behalf of the Gharda entities were anything more than passively aware of the tests performed on behalf of CSI. More importantly, the alleged agreement or acquiescence of other investigators does not substitute [*124] for a demonstration by CSI that its testing methodology was reliable.

The virgin unburned Gharda product that was contained in the drums before the fire had decomposed or degraded before the vapor samples were collected. Thus, the badge testing was performed on vapors "found or absorbed into each badge" during the time the badges were exposed inside the overpacks. Russo agreed that the testing only showed relative amounts of the substances detected in the vapors, and it was not quantitative in the sense that the testing did not quantify how much of each detected substance was present before the fire. Nevertheless, Dr. Armstrong endorsed this testing process as being "extremely standard" and "the most convenient, simplest way to identify the volatiles that are associated with the fire debris." It was by this method that the CSI experts tested the charcoal badges in an attempt to document the contents of the drums.

Dr. Armstrong tested the charcoal badges, describing the work he did as analyzing "fire debris." The results from this process, which started nearly two weeks after the fire, detected the presence of numerous "volatile components" [*125] in some of the overpacks used in the testing.¹⁰ One of the substances detected by the testing was toluene, a flammable substance. Dr. Armstrong initially developed an opinion--which CSI disclosed in discovery--that the fire was caused by chlorpyrifos technical that was contaminated with toluene. However, subsequent to the disclosure of this opinion, fact discovery in the case revealed that toluene was not used in Gharda's manufacturing processes. Dr. Armstrong testified in his deposition that his realization that toluene "was not used in the production" and thus "would not be present due to an impurity . . . in the chlorpyrifos" led to "further evaluation" and his "change of position."

10 Dr. Armstrong testified that his "evaluation established that there were volatile components

present in the hotbox after the fire," and that "[t]hese volatile components included, but [were] not limited to, toluene, EDC, aromatic compounds, other structures other than toluene, such as . . . ethylbenzene and xylenes and few other things were found in the system, mainly a lot of pyrolysis products from the various barrels."

With toluene contamination ruled out as a cause of the fire, Dr. Armstrong selected [*126] a different substance detected by some but not all of the badge tests: a solvent used to manufacture chlorpyrifos known as EDC. The badges used to test specific drums identified as the source of the fire did not show any evidence of EDC, but Dr. Armstrong explained that result by saying that severe burning of those drums caused all of the EDC to evaporate. When Dr. Armstrong first identified EDC as the substance that caught fire, he had no theory about how it ignited. He later supplemented his opinion with his explanation that the chemicals spontaneously combusted. He explained, "[I]t is my opinion, based on my scientific training and experience and the literature that's available to me, especially the Gharda literature, that the system underwent a series of reactions after it was melted that ultimately caused a runaway reaction."

Importantly, Dr. Armstrong did not conduct any tests to confirm the reliability of the badge-test protocol, nor did he conduct any tests to confirm that EDC-contaminated chlorpyrifos could spontaneously combust under the conditions present in the hot box. He did not determine how much EDC had to be present to produce a spontaneous combustion or otherwise test [*127] to confirm the actual presence of a sufficient amount of EDC contamination to start the fire. He did not review any studies about whether chlorpyrifos could self-combust, including no review of any studies about the effect of EDC contamination on chlorpyrifos. Instead, Dr. Armstrong expressly assumed the fire began in the hot box and then effectively relied on the process of elimination to deduce the cause, as illustrated during his cross-examination at the *Robinson* hearing:

Q [N]o one was able to identify any source of the ignition within the hotbox, were they?

A That is correct, to my knowledge, no one can specifically identify a component of the hotbox that would cause ignition.

Q And so since no one knows of any component to cause ignition to the hotbox, you came to the conclusion it had to be spontaneous because there's no source of ignition, right?

A Well, one of the premises of investigation is if you eliminate all other sources, it has to be the one that's left, so yes.

....

Q [R]eally what you did was reverse engineer because you took the idea it had to be in the hotbox because that's what these fire and origin guys say; and so if the only thing is in there, then it has to be [*128] the chlorpyrifos, right?

A That's -- except for the reverse engineering, that's very logical.

Q And then if there's no source of ignition in there, then, well, it's just got to just self-ignite, right?

A Yes, sir, that is -- the logic follows very nicely. I like your logic.

Q And you don't have to -- then you did not perform any test to figure out whether or not there was, in fact, enough EDC in there or even how much EDC it would have to have in it in order for this spontaneous combustion to have or even perform any test in order to support the position that you're taking. You just didn't do any of that testing, did you, sir?

A Personally I did not test this product under those conditions. I relied upon the analytical data, the published literature from other sources to provide that information.

Indeed, Dr. Armstrong dismissed the notion that testing played any meaningful function in his role as a retained expert witness for the case. He testified that "running a [*129] couple of experiments just to say, 'I ran an experiment,' I don't believe is necessary, fruitful or beneficial. Science must rely on independent evaluation of the phenomenon that we are discussing. And it's simply very, very straightforward."

Although Dr. Armstrong produced the badge tests as his evidence that EDC was detected in the air trapped inside the "overpacks," and he relied upon those tests to deduce that the fire was caused by excess EDC present in the chlorpyrifos drums, the foregoing analysis did not enable him to offer his own expert opinion that an amount of EDC sufficient to cause a spontaneous combustion was actually present in the Gharda product. In an

attempt to fill that analytical gap, CSI turned to another expert witness, Dr. Nick Cheremisinoff.

C. Dr. Nick Cheremisinoff, chemical engineer

CSI retained Dr. Cheremisinoff to review Gharda's manufacturing process and to provide expert testimony in support of the theory, which could not be confirmed by the badge testing, that the drums of chlorpyrifos were contaminated by excessive amounts of EDC. Based on his judgment that Gharda's manufacturing process was very complex and labor intensive, he concluded that it was "within [*130] the realm of probability" and "possible" that such EDC contamination had occurred.

Dr. Cheremisinoff expressly assumed that the fire was caused by the chlorpyrifos, and he admitted that he did not know how it was ignited. He conducted no tests to support his opinion, and he relied upon no peer-reviewed studies to support his criticisms of the Gharda manufacturing process. He did not base his opinion on any evidence of actual EDC contamination. He reviewed Gharda's written manufacturing protocols, but he never personally observed Gharda's plant or any of its manufacturing procedures.

II. Analysis

Although the panel majority refers to the district court's discretion with respect to evidentiary matters, this is an appeal from the trial court's order granting JNOV, which we review de novo under a no-evidence standard. See *City of Keller v. Wilson*, 168 S.W.3d 802, 823 (Tex. 2005); *Johnson v. Methodist Hosp.*, 226 S.W.3d 525, 528 (Tex. App.--Houston [1st Dist.] 2006, no pet.). On appeal we apply the same standards of legal and factual sufficiency that would apply to any civil dispute and which presumably informed the district court's consideration of the motion for JNOV.¹¹

11 The Gharda entities [*131] suggest that the trial court's ruling should be reviewed for abuse of discretion, relying on *Raynor v. Merrell Pharms., Inc.*, 104 F.3d 1371, 1373-74, 323 U.S. App. D.C. 23 (D.C. Cir. 1997), and *Comer v. Am. Elec. Power*, 63 F. Supp. 2d 927, 930-31 (N.D. Ind. 1999). The reasoning applied in these cases, governed by federal rules of procedure, does not support abuse-of-discretion review under the Texas rules. The trial court exercised its discretion in connection with evidentiary rulings when it conducted the pretrial gatekeeping hearing and when it ultimately admitted the opinions of plaintiffs' experts into evidence. By the time the Gharda entities filed their motion for JNOV, the trial court's discretion had been exercised, the jury had rendered a verdict, and the question before

the trial court was whether the jury's findings had any support in the evidence. See *TEX. R. CIV. P. 301*; cf. *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 638 (Tex. 2009) ("[A] party may assert on appeal that unreliable scientific evidence or expert testimony is not only inadmissible, but also that its unreliability makes it legally insufficient to support a verdict."). The motion for JNOV was not, as suggested by the Gharda entities' [*132] argument, an opportunity for the trial court to revisit and revise the discretionary trial rulings that it had previously rendered.

"An expert witness may testify regarding scientific, technical, or other specialized matters if the expert is qualified, the expert's opinion is relevant, the opinion is reliable, and the opinion is based on a reliable foundation." *Whirlpool Corp. v. Camacho*, 298 S.W.3d 631, 637 (Tex. 2009) (citing, inter alia, *TEX. R. EVID. 702*). "Conclusory or speculative opinion testimony is not relevant evidence because it does not tend to make the existence of material facts more probable or less probable." *Id.* (citing *TEX. R. EVID. 401* and *Coastal Transp. Co. v. Crown Cent. Petroleum Corp.*, 136 S.W.3d 227, 232 (Tex. 2004)). We are required to "rigorously examine the validity of facts and assumptions" on which expert testimony is based, "as well as the principles, research, and methodology underlying the expert's conclusions and the manner in which the principles and methodologies are applied by the expert to reach the conclusions." *Id.* (citing *Exxon Pipeline Co. v. Zwahr*, 88 S.W.3d 623, 629 (Tex. 2002)). "[E]ach [*133] material part of an expert's theory must be reliable." *Id.*

A. Deficiencies of individual experts

The majority opinion uncritically describes the testimony offered by each of CSI's putative experts, reciting each expert's assertions, and concluding that each expert offered admissible opinion testimony. This flawed approach completely abandons the court's "gatekeeper" function with respect to expert testimony by dodging the Gharda entities' criticisms of each expert and failing to critically analyze the substance of what each expert presented to the jury. And while the objections to each expert were legion, a central theme was that each expert depended on some critical element that had to be supplied by another expert.

i. Russo

Sammy Russo was presented to establish that the fire originated in the hot box.¹² Although his testimony explained his hypothesis that the fire began with an explosion in the hot box, he did not provide his own opinion testimony about whether or how such an explosion

actually came about. He needed to rely on some other expert to supply that explanation.

12 The majority opinion suggests that Russo was an unbiased scientific investigator whose work was not tainted by [*134] the incentives to support CSI's litigation objectives, emphasizing that "Russo testified that his own involvement in this case began as a fire-origin investigator in the immediate aftermath of the fire and that he formed his opinions regarding the fire's origins in that capacity." The majority then quotes Judge Kozinski's opinion on remand in *Daubert* and the opinion of the Supreme Court of Texas in *Robinson* for the proposition that "when an expert prepares reports and findings before being hired as a witness, that record will limit the degree to which he can tailor his testimony to serve a party's interests." *Robinson*, 923 S.W.2d at 559 (quoting *Daubert v. Merrell Dow Pharms., Inc.*, 43 F.3d 1311, 1317 (9th Cir. 1995)). In fact, as noted in the majority opinion and admitted by Russo on direct examination, his involvement in the matter began when his office received a call from the firm of the trial lawyers hired by CSI. Accordingly, the majority misuses *Daubert* and *Robinson* to varnish the fact that Russo was hired by CSI's trial counsel and developed his opinions for use in litigation. Given this fact, there is no reason to characterize his method as "non-judicial" or to conclude that [*135] his analysis may be reliable on such a basis. The reliability of the NFPA 921 methodology, which Russo putatively applied, is not disputed in this case. The dispute is about whether Russo actually and faithfully applied the methodology.

As a threshold matter, Russo's opinions are unreliable due to his failure to follow NFPA 921, and his opinion testimony was properly disregarded for that reason alone. The significance of "V" patterns relied upon by Russo to determine the place of origin has been criticized as a "discredited" theory in this context.¹³ Moreover, Russo relied heavily on the characterization of the doors to the hot box as having been "pushed open" or "blown open," yet he provided no explanation meeting the *Robinson* standard for how such a rupture could have occurred despite the fact that after the fire the bung holes caps for the Gharda drums were found resting undisturbed on the tops of the drums where CSI personnel had left them.¹⁴

13 See 5 FAIGMAN ET AL., *supra* note 1, § 39:13, at 197; see also WILLINGHAM REPORT, *supra* note 1, at 23 ("In the early 1990's, many fire investigators based their conclusions of origin in part on

the theory that a 'V-pattern' on a wall points to [*136] the origin of the fire. . . . Scientists now know that the 'V-pattern' simply points to where something was burning at some stage of the fire, not necessarily the origin."). We cannot ignore such "fatal gaps in an expert's analysis or assertions," nor "credit as some evidence expert opinions that are not reliable or are conclusory on their face." *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 912 (Tex. 2004).

14 The majority opinion quotes Russo's testimony regarding the fact that the bung hole caps for the Gharda drums were found after the fire, resting on top of the drums inside the hot box. But the majority never addresses the significance of that evidence or Gharda's argument that it tends to disprove Russo's hypothesis of an explosion inside the box of such magnitude that it "blew" open the doors. The majority opinion recites Russo's attempt to explain the presence of the undisturbed bung caps when he said, "You don't have differential pressure to blow those bungs out or give direction to this--this type of event." Yet the majority opinion does not critically consider this explanation, which, based on the record presented to us, has no apparent scientific basis at all. There [*137] is no basis in the record for confirming the reliability of the statement; we only have the fact that Russo said it.

Russo's most glaring departure from the NFPA 921 methodology, and the one that most seriously undermines the reliability of his opinion testimony, was his failure to subject his hypothesis to meaningful testing. The hypothesis about the place of the fire's origin could not become a reliable opinion about the cause and origin of the fire without a credible explanation of how the fire could have started there.¹⁵ Russo admitted as much when he testified that if the drums inside the hot box had been filled with water or another liquid that was not ignitable, he could not have formed an opinion that such a liquid was the source of the fire in the hot box. The record contains no evidence that Russo (or any other CSI expert) was aware of any test showing whether or under what conditions chlorpyrifos contaminated with EDC could spontaneously combust. Nor did he (or any other CSI expert) personally test the theory. Nevertheless, he offered his opinion that the fire started in the hot box, relying solely upon the other experts who opined that this scenario could and did happen. [*138] Russo's opinion, standing alone, was unreliable in the absence of supporting scientific testing. *See, e.g., Whirlpool*, 298 S.W.3d at 640-42; *see also Zeigler v. Fisher-Price, Inc., No. C01-3089-PAZ*, 2003 U.S. Dist. LEXIS 11184, 2003 WL 25686840, at *10 (N.D. Iowa July 1, 2003) (holding that in the absence of scientific testing, a proposed cause-and-

origin analysis based on an expert's "common-sense deductions" merely constituted "unsupported personal observations" and thus could not be admitted into evidence); REPORT OF THE TEXAS FORENSIC SCIENCE COMMISSION: WILLINGHAM/WILLIS INVESTIGATION, at 30 (2011), *available at* <http://www.fsc.state.tx.us/documents/FINAL.pdf> ("Fire investigators should have a thorough understanding of the importance of laboratory testing as a tool for confirming the theory of a case . . .").

15 It is unclear from the appellate record whether NFPA 921 would strictly require the confirmation of a potential ignition source before a reliable opinion can be formed about the physical origin of the fire. However, Russo expressly agreed that in order to "really test" his hypothesis, he would "have to have some testing that would show that under the circumstances involved, whatever was in this barrel [*139] would be something that could be a source of an ignitable vapor." Other authorities also confirm the Gharda entities' characterization of the standard as incorporating a testing requirement. *See, e.g., Fireman's Fund Ins. Co. v. Canon U.S.A., Inc.*, 394 F.3d 1054, 1058 (8th Cir. 2005) ("NFPA 921 requires that hypotheses of fire origin must be carefully examined against empirical data obtained from fire scene analysis and appropriate testing."); *Royal Ins. Co. of Am. v. Joseph Daniel Constr., Inc.*, 208 F. Supp. 2d 423, 426 (S.D.N.Y. 2002) ("The NFPA 921 sets forth professional standards for fire and explosion investigations and provides a six step process in which an investigator must: (1) recognize that a need exists to determine what caused the fire; (2) define the problem; (3) collect data; (4) analyze the data; (5) develop a hypothesis based on the data; and (6) test the hypothesis." (citing TECHNICAL COMMITTEE ON FIRE INVESTIGATIONS, NATIONAL FIRE PROTECTION ASSOCIATION, NFPA 921: GUIDE FOR FIRE AND EXPLOSION INVESTIGATIONS, at 9-10 (1998 ed.)).

As explained below, the analytical gap in Russo's methodology was not filled by the opinions of any of the other experts. To the extent that [*140] Russo purported to provide an overarching opinion about cause and origin, that opinion was only as reliable as the subsumed opinions about the cause of the fire. To the extent that Russo's opinion was limited, as he himself stated, solely to the location of the fire's origin, even that aspect of his opinion was unreliable due to methodological failures, particularly the failure to actually test the hypothesis or otherwise reliably confirm that a spontaneous combustion was possible under the circumstances. *See, e.g.,*

Fireman's Fund Ins. Co. v. Canon U.S.A., Inc., 394 F.3d 1054, 1058-59 (8th Cir. 2005) (concluding that proposed experts did not conform to methods of NFPA 921 when experimental testing failed to produce an open flame and the hypothesized malfunction could not be adequately explained in theory or replicated in a test).

ii. Dr. Armstrong

Dr. Armstrong was presented to supply an explanation for how the fire could have spontaneously ignited as a result of rapid chlorpyrifos decomposition due to EDC contamination in the Gharda product. His analysis expressly assumed a critical disputed fact: that the fire started in the hot box. Thus, his analysis did not account for the possibility [*141] that there was no explanation for the fire's origin within the hot box because the fire actually started someplace else. "An expert who is trying to find a cause of something should carefully consider alternative causes," and the failure to rule out other causes of the damage renders an opinion "little more than speculation." *Robinson*, 923 S.W.2d at 559.

Even assuming that the fire started in the hot box, Dr. Armstrong's method for identifying EDC-contaminated chlorpyrifos as the culprit was unreliable. In the absence of physical evidence that the fire was caused by EDC contamination, Dr. Armstrong freely admitted that he relied upon the process of elimination to draw that conclusion. However, such reasoning cannot substitute for scientific analysis, particularly when a critical disputed fact has been assumed--in this case, the place of the fire's origin--as an analytical shortcut to avoid the rigors of actual scientific analysis. Cf. *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 807-08 (Tex. 2006) ("The universe of possible causes for the tire failure is simply too large and too uncertain to allow an expert to prove a manufacturing defect merely by the process of elimination."). [*142] Such uses of the process of elimination have been scathingly criticized in the context of developing a reliable opinion about the cause of a fire:

The process of determining the ignition source for a fire, by eliminating all ignition sources found, known, or believed to have been present in the area of origin, and then claiming such methodology is proof of an ignition source for which there is no evidence of its existence, is referred to by some investigators as "negative corpus." Negative corpus has typically been used in classifying fires as incendiary, although the process has also been used to characterize fires classified as accidental. This process is not consistent with the

Scientific Method, is inappropriate, and should not be used because it generates un-testable hypotheses, and may result in incorrect determinations of the ignition source and first fuel ignited. Any hypothesis formulated for the causal factors (e.g., first fuel, ignition source, and ignition sequence), must be based on facts. Those facts are derived from evidence, observations, calculations, experiments, and the laws of science. Speculative information cannot be included in the analysis.

5 DAVID L. FAIGMAN [*143] ET AL., MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY § 39:65, at 291 (2011-2012 ed.) (quoting TECHNICAL COMMITTEE ON FIRE INVESTIGATIONS, NATIONAL FIRE PROTECTION ASSOCIATION, NFPA 921: GUIDE FOR FIRE AND EXPLOSION INVESTIGATIONS § 18.6.5 (2011 ed.)); see also *Somnis v. Country Mut. Ins. Co.*, 840 F. Supp. 2d 1166, 1172-73 (D. Minn. 2012) (allowing fire investigator to testify about the absence of accidental causes, but excluding opinion testimony that "the absence of an accidental explanation suggests the fire was incendiary").

There was no physical evidence of EDC contamination in the drums identified by Russo as the origin of the fire. Dr. Armstrong relied instead on evidence of EDC present in other drums, and he therefore speculated that EDC had also been present in the drums where Russo hypothesized that the fire was started. Dr. Armstrong explained away the absence of evidence of EDC in those drums by further speculating that it was entirely consumed in the fire. To the extent this reasoning can be characterized as the discredited "negative corpus" methodology, it does not support a reliable opinion that the fire was caused by spontaneous combustion of chlorpyrifos [*144] contaminated with EDC.

Even to the extent that Dr. Armstrong relied upon evidence of EDC in other drums to support an inference that EDC had been present at the source but entirely consumed in the fire, that evidence itself resulted from an unreliable, untested, non-peer-reviewed process of collecting airborne chemicals from charcoal patches to identify the presence of contaminants.¹⁶ No tests were conducted to determine whether the presence of excessive levels of EDC existing before the fire could be reliably detected after the fire by the badge-testing method. And no tests were conducted to verify whether a drum of chlorpyrifos contaminated with a sufficient level of EDC to create a spontaneous combustion could be burned so thoroughly as to eliminate all evidence of the EDC. In particular, neither Dr. Armstrong nor any other expert

was able to explain how there could have been sufficient amounts of EDC contamination to cause spontaneous combustion of the chlorpyrifos, considering Gharda's tests that showed chlorpyrifos would not burn with EDC levels up to 10%, at which level the top 60% of the drum would have been liquid. The undisputed evidence from CSI's own employees was that the [*145] contents of the drums of chlorpyrifos at issue were solid at the time they were placed in the hot box. The failure to account for this fact renders Dr. Armstrong's methodology and opinion unreliable. *See Volkswagen, 159 S.W.3d at 912.*

16 The majority opinion relies upon Dr. Armstrong's conclusory assertion that the badge-testing protocol was a "tried and true" "standard test" to identify the presence of EDC in the drums prior to the fire. As characterized by the majority, the test was conducted "in accordance with 'ASTM E1618,' which provides the standard test method for ignitable liquid residues in extracts from fire debris samples by gas chromatography-mass spectrometry, like the 3M badges." However, nothing in the record suggests that the CSI experts' particular application of the charcoal badges in this case, placing them inside "overpacks" with the chemical drums nearly two weeks after the fire, is a method authorized or approved by ASTM E1618. Indeed, as demonstrated by the record of the *Robinson* hearing, ASTM standards were invoked only with respect to the "passive absorption elution technology" used in the charcoal badges and the "gas chromatograph mass spectrometry evaluation [*146] of the sample." No peer-reviewed non-judicial ASTM standard was invoked as an authority for Russo and Armstrong's so-called badge-testing "protocol" for the identification of contaminants that may have been present before the fire.

Additionally, the ambient air was not subjected to a badge-test to establish a control against which the other badges could be compared. CSI's warehouse was located in the industrial area located around the Houston Ship Channel. The warehouse had stored a variety of chemicals before the fire. The toxic atmosphere present in the fire's aftermath was vividly illustrated by the full-body protective suit worn by Russo as a precautionary measure. To the extent the charcoal badges placed into "overpacks" with the Gharda drums detected trace amounts of EDC weeks after the fire, the badge-testing methodology did not even purport to distinguish EDC that might have been present in the drums of chlorpyrifos before the fire from what EDC might have been present in the ambient air. Indeed, Dr. Armstrong himself relied on the existence of extraneous chemicals in the ambient air to explain the badge tests' detection of toluene that

was proved not to be part of Gharda's [*147] manufacturing process. The badge-testing process was therefore self-evidently unreliable due to its lack of testing, *see Whirlpool, 298 S.W.3d at 640-42*, and its failure to reliably account for the alternative possibility that the badges were detecting extraneous chemicals present in the ambient air, *see Volkswagen, 159 S.W.3d at 912.*

Finally, we should not ignore the evolution of Dr. Armstrong's opinions, which betrays the methodological flaw of beginning from a preordained conclusion to fit a litigation strategy, and then constructing explanations to support the conclusion. Based upon the charcoal patches' indication that toluene was present, Dr. Armstrong originally offered an opinion that the spontaneous ignition of chlorpyrifos occurred due to toluene contamination. When fact discovery subsequently confirmed that toluene was not used in Gharda's production of chlorpyrifos but that EDC was, he simply changed his opinion to say that EDC contamination was the cause of the fire. When he offered these opinions, he had no basis for knowing whether the chlorpyrifos actually was contaminated by toluene or EDC. The fact that Dr. Armstrong was able to so easily substitute an opinion of EDC [*148] contamination for a demonstrably incorrect initial opinion of toluene contamination further undercuts the reliability of his methodology. *Cf. Comer v. Am. Elec. Power, 63 F. Supp. 2d 927, 935 (N.D. Ind. 1999)* (noting that the ability of a "so-called expert" to change his opinions based on suggestions from counsel demonstrated that the testimony was "nothing more than unscientific speculation" and "mere *ipse dixit*").

A methodology that is designed to confirm a preconceived conclusion is the antithesis of the scientific method and unreliable by definition. *See Robinson, 923 S.W.2d at 559.* The unreliability of Dr. Armstrong's method is further demonstrated by his studied refusal to test any of his opinions, indeed, his brazen disdain for the suggestion that testing was "necessary, fruitful or beneficial." *See Whirlpool, 298 S.W.3d at 640-42.* Accordingly, due to these methodological flaws, Dr. Armstrong's opinion constituted no evidence of the cause of the fire.

iii. Dr. Cheremisinoff

Dr. Cheremisinoff merely opined that it was "quite possible" that flaws in Gharda's manufacturing process could result in EDC contamination. On its face, this opinion lacks the scientific reliability necessary [*149] to be admissible under *Rule 702*. That assessment is confirmed by the flaws of Dr. Cheremisinoff's method, which included absolutely no testing. He did not offer any reliable opinion that the Gharda product at issue actually was contaminated. Although Gharda had kept "retains," samples from the actual batch of chlorpyrifos

from which the product at issue was taken, Dr. Cheremisinoff did not test those retains. He did not perform any other testing to support his opinion that it was "quite possible" that the Gharda product at issue in this case was contaminated by EDC to any particular degree. These opinions constituted no evidence that the chlorpyrifos placed inside CSI's hot box was actually contaminated by EDC such that it could have spontaneously ignited and started the fire, as assumed by both Russo and Armstrong.

B. Deficiencies of cumulative expert opinions

The majority opinion does not consider the interrelatedness of these opinions or the problems arising from their interdependence. Expert witnesses may rely upon the work of other experts, but weaknesses in the reliability of an underlying witness's opinion infect the opinions of any other experts who rely upon it.

In this case, [*150] CSI attempted to present a case in which multiple experts supplied different pieces of a puzzle:

- o Russo, and to a lesser extent, fire marshal Harold Rice, to depict the hot box as the likely origin of the fire, assuming that was possible;

- o Armstrong to state that the fire could have started inside the hot box, assuming that the fire actually started there and also assuming that the product actually was contaminated; and

- o Cheremisinoff to opine about the possibility of a defect in the product present in the hot box, assuming that the product had spontaneously combusted.

None of these experts offered a nonconclusory opinion with sufficient reliability to snap a single piece of the puzzle into place. Neither Russo nor Rice could reliably determine the fire's origin without confirming a consistent cause. Dr. Armstrong could not affirmatively testify about the cause of the fire without assuming that it had originated in the hot box or without also assuming that a contaminated product was present. Dr. Cheremisinoff could not determine that there was an actual product defect; he could only opine that Gharda's manufacturing process was imperfect and, in light of his assumption that the product [*151] had spontaneously burst into flames, that it was "quite possible" that EDC contamination occurred. None of these assumptions turned out to be reliable, considering that each opinion--apart from requiring bolstering from some other prof-

fered expert's opinion--suffered from its own methodological flaws.

In particular, Dr. Armstrong was not justified in assuming that the Gharda product inside the hot box was the catalyst for the fire. That assumption alone effectively assumed the entire dispute in favor of CSI and left Dr. Armstrong in the position of merely explaining a foregone conclusion to the best of his ability. "An expert who is trying to find a cause of something should carefully consider alternative causes," *Robinson*, 923 S.W.2d at 559, but Dr. Armstrong did not engage in that level of inquiry. Assuming the hot box as the place of fire origin excused him from considering the central question that a reliable methodology would have addressed: Were there alternative possible causes such that it is more likely that the chlorpyrifos did not degrade and ignite the fire? Dr. Armstrong was relieved from this inquiry by simply assuming that the correct location of the fire had been identified [*152] and confining his analysis to the restricted universe of factors existing inside the hot box, one of which had to be the cause under his assumed scenario. His assumption did not permit a conclusion that no cause existed inside the box. "An expert's failure to explain or adequately disprove alternative theories of causation makes his or her own theory speculative and conclusory." *Wal-Mart Stores, Inc. v. Merrell*, 313 S.W.3d 837, 840 (Tex. 2010) (per curiam) (citing *Gen. Motors Corp. v. Iracheta*, 161 S.W.3d 462, 470 (Tex. 2005)). Because Armstrong's opinion as to the fire's cause rests upon an unreliable method, it cannot bolster Russo's opinion as to the location of the fire's origin, which in turn assumes the causative element supplied by Armstrong.

Even setting aside the inherently flimsy structure of CSI's case, with one conditional opinion stacked upon another stacked upon another, each opinion taken individually bears substantial indicia of unreliability. CSI's expert case is a classic example of opinions which were conducted and formed for the purpose of litigation. *See Robinson*, 923 S.W.2d at 559. Moreover, the experts utterly failed in their responsibility to test their theories. [*153] *See Whirlpool*, 298 S.W.3d at 640-42. No testing was conducted to confirm the reliability of the method used to collect samples, which consisted of placing charcoal badges in the barrels nearly two weeks after the fire. Although CDI's experts ultimately advanced a theory of EDC contamination, the badge testing recorded a greater amount of toluene, a contaminant that was not used in Gharda's production of chlorpyrifos. No testing was performed to exclude the possibility that the EDC, like the toluene, was detected because EDC was present in the air at the location of the warehouse--near the Houston Ship Channel--rather than because EDC was still present in the product days after the fire. Dr. Armstrong did not test

his theory that chlorpyrifos contaminated with EDC could spontaneously ignite under the conditions created in the hot box. Dr. Cheremisinoff did not test his theory that the Gharda manufacturing process could result in EDC contamination, nor did he test the actual product retains to determine whether they bore any evidence of contamination.

It was CSI's burden to prove liability at trial, and it also bore the burden of demonstrating the admissibility of its proffered expert opinions [*154] under *TEX. R. EVID.* 702. See *Whirlpool*, 298 S.W.3d at 639 ("The proponent must satisfy its burden regardless of the quality or quantity of the opposing party's evidence on the issue and regardless of whether the opposing party attempts to conclusively prove the expert testimony is wrong."). To the extent that CSI argued, and the majority opinion relies upon, assertions that it was not possible to perform tests to confirm the reliability of the methods employed by its experts, that factor does not lower CSI's burden to prove its case, whether through appropriate expert opinion testimony or otherwise. "Testing is not always required to support an expert's opinion, but lack of relevant testing to the extent it was possible, either by the expert or others, is one factor that points toward a determination that an expert opinion is unreliable." *Id.* at 642. "If testing of critical aspects of an expert's testimony has not taken place either by the expert or others in the relevant scientific or expert community, then an explanation of why it has not is an important consideration in evaluating the expert opinions and determining whether they are substantively more than merely the expert's conclusory, [*155] subjective opinion." *Id.* at 642-43. The explanations provided by CSI, that testing would have been expensive, time-consuming, inconvenient, or even dangerous, do not mitigate the unreliability of opinions that might have been supported (or discredited) by appropriate tests.

Given the lack of testing, the deficiencies of CSI's expert opinions in this case are similar to those encountered by the Supreme Court of Texas in *Whirlpool v. Camacho*, and the reliability analysis should accordingly be the same. As in *Whirlpool*, CSI's experts' theories were "developed for the litigation." *Id.* at 643 (citing *Robinson*, 923 S.W.2d at 559, for the proposition that "opinions formed solely for the purpose of testifying are more likely to be biased toward a particular result"). The opinions and theories had not been published in any sci-

entific journal, treatise, or publication so they could be subjected to peer review by someone other than experts retained by CSI in regard to the lawsuit, nor did CSI's experts indicate that all of the relevant theories had been accepted as valid by relevant scientific or expert communities. See *Id.* (citing *Merrell Dow Pharms., Inc. v. Havner*, 953 S.W.2d 706, 727 (Tex. 1997), [*156] for the proposition that the "purpose of publication and peer review is to allow the relevant community to comment on the expert's theories, findings, and conclusions"). The opinion testimony about the cause and origin of the fire was fundamentally unreliable, and it therefore constituted no evidence to prove the Gharda entities' liability for damage caused by the fire.

C. Sufficiency of remaining evidence

CSI contends that even without the expert testimony, the jury's verdict is supported by adequate circumstantial evidence to support the claims against Gharda. I disagree. Even if the circumstantial evidence is sufficient to support a conclusion that the fire started in the hot box and therefore likely originated with the Gharda product, the circumstantial evidence does not prove the causative element necessary to hold Gharda liable for CSI's claimed damages. As in *Whirlpool*, the other evidence produced at trial and relied upon by CSI's experts may be consistent with and support a conclusion that fire was in and around the hot box, but that evidence does prove that the fire originated as CSI's experts said it did. See *Id.* (citing *Mack Trucks*, 206 S.W.3d at 580); see also *Merrell*, 313 S.W.3d at 840 [*157] (characterizing expert's specific causation theory as "amount[ing] to little more than speculation" because "evidence that halogen lamps can cause fires generally . . . does not establish that the lamp in question caused this fire"). The evidentiary record in this case provides no support for an assumption that a manufacturing defect was the reason for the fire rather than some flaw introduced after the product left Gharda's control or some error committed by CSI, which had control of the product after it accepted delivery.

I would affirm the district court's take-nothing judgment. Because the majority has concluded otherwise, I respectfully dissent.

Michael Massengale

Justice