UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF LOUISIANA

IN RE: CHINESE-MANUFACTURED DRYWALL PRODUCTS LIABILITY LITIGATION	**MDL NO. 2047** **SECTION: L** **JUDGE FALLON** **MAG. JUDGE WILKINSON**
THIS DOCUMENT RELATES TO: **Tatum B. Hernandez, et al. v. Knauf Plasterboard (Tianjin) Co. Ltd., et al., Case No. 09-cv-06050 (E.D.La.)**	

KNAUF PLASTERBOARD (TIANJIN) CO. LTD.'S PROPOSED
FINDINGS OF FACT AND CONCLUSIONS OF LAW

Based on the testimony at the trial held between March 15th and March 19th and the Record evidence of this matter, Knauf Plasterboard (Tianjin) Co. Ltd. ("KPT") respectfully requests that this Court enter the following Findings of Fact and Conclusions of Law pursuant to Federal Rule of Civil Procedure 52:

FINDINGS OF FACT

I. PARTIES AND STIPULATED FACTS.

1. The Court granted Plaintiffs' voluntary dismissal of Knauf Gips KG, Taishan Gypsum Co. Ltd., f/k/a Shandong Taihe Dongxin Co., Ltd., USG Corporation, L&W Supply Corporation d/b/a Seacoast Supply, Independent Builders Supply Association, Inc. and Rothchilt Ltd. (December 11, 2009 Order.) KPT is the only defendant in this matter. (*Id.*)

2. On February 24, 2010, the Court entered a Joint Stipulation whereby KPT and Plaintiffs stipulated that KPT manufactured drywall that was purchased by Plaintiffs and is contained in Plaintiffs' house. (Joint Stipulation, February 24, 2010, ¶¶ 7-8.) The

drywall emits certain reduced sulfur gases and an odor. (*Id.*, ¶ 9.) Plaintiffs would not have purchased this drywall had they known about the emission of reduced sulfur gases and odor at the time of sale. (*Id.*, ¶ 10.)

3. On March 12, 2010, the Court entered a second Joint Stipulation whereby KPT and Plaintiffs stipulated that the following would be removed and replaced in repairing Plaintiffs' house: all drywall, Chinese and domestic (except for "green board" in the bathrooms), all insulation, all flexible duct-work, all switches and receptacles, all molding and all countertops. (Joint Stipulation, March 12, 2010, ¶ 4.) This Joint Stipulation was entered by KPT based upon the particular circumstances of this property and the referenced characteristics of the drywall product that was installed in the property.

4. Because of these stipulations, the evidence presented at trial related solely to the proper measure of damages, which requires the Court to assess the competing repair protocols for the Hernandez house presented by the parties. Plaintiffs' proposed protocol guts the house and removes almost all materials in the house based on the perception of future risk. KPT's proposed protocol removes the source of any corrosion and leaves copper wiring and plumbing in the house because they are currently functional and there is no evidence of future risk. Both protocols have significantly different costs associated with them.

5. Based upon evidence presented at trial and the findings of fact and conclusions of law below, the Court finds that KPT's protocol adequately repairs the Hernandez house by removing the source of the corrosion at a reasonable cost.

II. KPT'S HIGHLY QUALIFIED EXPERTS SUPPORT ITS REPAIR PROTOCOL.

6. KPT offered leading scientists in the fields of corrosion, materials science failure and repair, and fire safety, who offered substantial justification for KPT's repair protocol. These experts confirm that the wiring and plumbing systems in the Hernandez house are fully functional and entirely safe.

7. This Court accepted Dr. Matthew Perricone in the fields of materials science and corrosion. (Tr. Vol. V, 824:3-4; DX 205.) Dr. Perricone is a Ph.D. materials scientist who specializes in materials analysis and corrosion issues at the RJ Lee Group. (Tr. Vol. V, 821:1-821:19; DX 205.) For example, Dr. Perricone assessed the material impacts of atmospheric corrosion on surrounding residences caused by a train derailment in South Carolina. He also assessed the corrosion impacts to surrounding buildings caused by the World Trade Center event of 2001. (Tr. Vol. V, 822:4-823:8.) Prior to RJ Lee Group, Dr. Perricone worked in the materials science and engineering center at Sandia National Laboratories, the institute charged by the CPSC with investigating corrosion allegedly associated with Chinese drywall on electronic components and devices. (Tr. Vol. V, 819:2-19; DX 205.) At Sandia National Laboratories, one of Dr. Perricone's primary areas of study involved issues related to the corrosion of stainless steel welds. (Tr. Vol. V, 819:10-19.)

8. This Court accepted Dr. Richard Lee in the fields of investigation and physics of corrosion, materials science, failure and repair. (Tr. Vol. III, 545:7-8, 12-13.) Dr. Lee is the founder and CEO of the RJ Lee Group, an industrial research laboratory with 350 employees and 20-25 Ph.D.'s. (Tr. Vol. III, 541:21-542-3.) Dr. Lee has extensive experience analyzing the physics of corrosion and designing remediation

programs. For example, Dr. Lee was in charge of the environmental team that analyzed the impact of the 2001 World Trade Center event on materials and structural issues in surrounding buildings, including a detailed assessment of corrosion and dust containment. (Tr. Vol. III, 543:16-544:22.) Before founding the RJ Lee Group, Dr. Lee worked at U.S. Steel where he worked extensively in failure and corrosion analysis. (Tr. Vol. III, 539:10-15.) While at U.S. Steel, Dr. Lee's team analyzed corrosion issues relating to the cable that U.S. Steel provided for the Golden Gate Bridge in San Francisco, thereby allowing the bridge to remain in service. (Tr. Vol. III, 540:7-15.) Dr. Lee also was on the forefront of developing remediation strategies for asbestos and other environmental issues at U.S. Steel when those issues were first considered in the 70s and 80s. (Tr. Vol. III, 541:3-11, 541:25-542:20.)

9. This Court accepted Dr. Craig Beyler in the field of fire safety engineering. Dr. Beyler holds Bachelor's and Master's degrees in civil engineering and combustion from Cornell University and a Ph.D. in fire research from Harvard University. (Beyler Tr., 9:9-24; DX 207.) He is also the Chair of International Fire Safety Science and reviews papers for the Fire Safety Journal and the Journal of Fire Science. (Beyler Tr. 11:17-22; DX 207.) Dr. Beyler serves as the technical director of Hughes Associates, a fire protection engineering and consulting firm. (Beyler Tr. 5:14-16; DX 207.)

10. KPT also offered seasoned Louisiana civil and electrical engineers, contractors with expertise in cost estimation, and tradesmen, who, consistent with the scientific evidence, provided a reasonable scope of repair based on their practical and on-the-ground experience. This Court accepted Raymond Canzoneri, Mark Hartenstein, Roy

Carubba and Bruce Fuselier in their respective fields of electrical code and engineering, electrical work, general contracting, cost estimation and civil engineering and plumbing. (Tr. Vol. III, 613: 21-23, 678:19-20; 704:13-17; Tr. Vol. IV, 736:2-3.) The tradesmen have decades of combined experience with residential building, construction and code issues in the parishes surrounding New Orleans and in New Orleans itself. (Tr. Vol. III, 610:22-611:2; Tr. Vol. III, 676:18-23; Tr. Vol. III, 728:11-12, 730:10-12; Tr. Vol. III, 703:1-4.) They have worked on residential house repair in the aftermath of Hurricane Katrina, (Tr. Vol. III, 611:3-9, 731:3-8; 733:19-24, 703:11-21), and use reliable cost estimates to value a residential house repair based on what real people charge for necessary services.

III. THE HERNANDEZ HOUSE NO LONGER HAS A CORROSIVE ENVIRONMENT ONCE THE DRYWALL IS REMOVED.

11. Plaintiffs and KPT agree that the drywall is to be removed from the Hernandez house. (Joint Stipulation, March 12, 2010.)

12. Plaintiffs' technical experts, Mr. Rutila and Mr. Krantz, agree that there is no longer a corrosive environment once the drywall is removed from the house. (Tr. Vol. I, 94:9-11; Tr. Vol. II, 252:10-12.)

13. The Court finds that the Hernandez house will not have a corrosive environment once the drywall is removed.

IV. REMOVING THE DRYWALL IS AN EFFECTIVE REPAIR OF THE HERNANDEZ HOUSE BECAUSE SULFIDE CORROSION STOPS.

14. Removal of drywall is an effective repair because it removes the source of any corrosive gases and stops sulfide corrosion on copper surfaces exposed to hydrogen sulfide. (Tr. Vol. III, 546:11-14.)

15. Hydrogen sulfide, as it approaches materials such as exposed copper wires and pipes, interacts either at the surface or in the atmosphere near the surface of the wire or pipe. The gas reacts in association with condensed moisture on the surface of the material, producing sulfide ions. These sulfide ions then give the copper in the wire the opportunity to release an electron into the environment that is grabbed by the sulfur. This physical process allows the film to build up. (Tr. Vol. III, 547:13-548:1.)

16. What occurs in the Hernandez house is the dissociation of hydrogen sulfide gas in the presence of copper. The result is the growth of a copper sulfide film on the surface of exposed copper. (Tr. Vol. III, 549:7-9 and 12.) In any type of continuing corrosion reaction, corrosion occurs because there are reactive species that will react and form a product. (Tr. Vol. V, 852:22-24.) Without the source of hydrogen sulfide, however, the sulfide corrosion on copper pipes and wires will stop – copper sulfide will not form. (Tr. Vol. III, 547: 3-9; 557: 3-7 and 17; Tr. V, 852:25-853:2.) The only corrosion process that will occur on exposed copper is what happens on copper normally. (Tr. Vol. III, 554:5-6.)

17. When only normal atmospheric corrosion occurs in the absence of a sulfide, the typical product formed is copper oxide. (Tr. Vol. III, 565:5-8.) The development of copper oxide will not do any further damage, even if there is sulfide tarnishing on the surface. (Tr. Vol. III, 565:11-12.) The normal copper oxide corrosion that occurs will be no different than if the source of hydrogen sulfide had never been there. (Tr. Vol. III, 546:16-24.)

18. The only bases for Plaintiffs' claim that sulfide or accelerated corrosion will continue in the Hernandez house after the removal of the drywall is a paper *Sulfide*

Scale Catalysis of Copper Corrosion, written by Jacobs and Edwards in 1999 ("Edwards paper") (LT 241) and second-hand reliance on Dr. Scully's opinions, as he did not testify and his opinions and reports were barred. (Tr. Vol. II, 261:23-262:2; March 15, 2010 Order.)

19. Plaintiffs point to the existence of corrosion as a risk, but have no idea of the likelihood of that risk. (Tr. Vol. II, 262:3-5.) Plaintiffs have not performed any testing to confirm that sulfide or any accelerated corrosion will continue once the drywall is removed. (Tr. Vol. II, 261:14-22.) Plaintiffs have no data to support with a reasonable degree of scientific certainty that corrosion will continue once the source is removed, except for what is reported in the Edwards paper. (Tr. Vol. II, 262:12-14; Tr. Vol. V, 915:16-21.)

20. The Edwards paper does not support the conclusion that copper sulfide or any accelerated corrosion will continue once the source of the hydrogen sulfide is removed. (Tr. Vol. II, 262:12-14; Tr. Vol. V, 915:19-917:4.) The Edwards paper and its conclusions are readily distinguishable and offer no basis for comparison to the environment in the Hernandez house. (Tr. Vol. V, 915:19-917:4.)

21. Copper sulfide is a stable material, and as Mr. Krantz agrees, is non-soluble in water. (Tr. Vol. II, 261:5-7; Tr. Vol. III, 549:13-21; Tr. Vol. V, 851:20-852:1.) The Edwards paper makes no claim supporting the proposition that copper sulfide on the exterior of pipes and wires can cause a self-catalyzing reaction as long as it remains stable. (Tr. Vol. III, 553:7-13.)

22. The purpose of the Edwards paper was to investigate corrosion inside potable water systems. (Tr. Vol. II, 257:5-7; Tr. Vol. III, 550:3-6; Tr. Vol. V, 916:2-7;

LT 241.) The paper examines what is occurring on the *inside* of pipes through which water containing certain ions is flowing. (Tr. Vol. III, 550:23-551-4.)

23. In the Edwards example, copper sulfide film acts like a semiconductor that facilitates the transfer of electron whole pairs between the copper and the water. This transfer enables copper ions to come out of the material and disperse into the water where the ions will react. Unlike the situation here, the Edwards paper discussed an experiment which included a constant source of new ions by replacing the water in the pipe and causing a continued reaction. (Tr. Vol. III, 552:9-19.)

24. The continual water source in the Edwards paper sweeps the metal away. (Tr. Vol. V, 916:16-25.) In atmospheric corrosion, corrosion or surface tarnishing results in the addition of mass because the ions are not transported away by moving water, they remain sitting on the copper surface. (Tr. Vol. III, 554:16-20; Tr. Vol. V, 916:25-917:4.)

25. As Mr. Krantz admits, the Edwards paper addresses an aqueous environment in which the copper is completely immersed in water, which is unlike the atmospheric, non-aqueous environment of the wiring and pipes in the Hernandez house. (Tr. Vol. II, 258:22-259:5.)

26. Additionally, other chemicals were introduced into the potable water solution used in the Edwards paper, including chloride, sulfate and bicarbonate. (Tr. Vol. II, 259:9-18; Tr. Vol. V, 550:15-22.) The additional constituents are not representative of the environment around the wires and plumbing in the Hernandez house. (Tr. Vol. III, 550:23-551:4.)

27. With respect to electrical components, the behavior of copper alloys when fully immersed in solution, like in the Edwards paper, is not relevant to their performance

under atmospheric conditions, as they exist in the Hernandez house. (Tr. Vol. V, 917:20-918:10 (addressing learned treatise, ASM Handbook Vo. 13B, "Corrosion of Copper and Copper Alloys".)

28. The potential for humid conditions in the Hernandez house is not enough to justify reliance on the Edwards paper. Humidity alone will not cause the copper sulfide reaction to continue because it is but one part in the overall equation of how the reaction takes place. (Tr. Vol. V, 854:17-22; Tr. Vol. III, 598:20-599:7.) A corrosive species, in the form of a hydrogen sulfide ion, must be present for the copper sulfide reaction to take place. (Tr. Vol. V, 854:22-855:1.)

29. The Court finds that the basis for Plaintiffs' contention that corrosion will continue once the drywall is removed – a single paper addressing aqueous corrosion – is insufficient. Mr. Krantz opines that the corrosion may continue but could not explain the nature of the reaction. The Court finds that Dr. Lee's and Dr. Perricone's explanation that continued sulfide corrosion of copper cannot occur without a source of sulfide is supported by the weight of the evidence.

V. THE FUNCTIONALITY OF ELECTRICAL WIRING IN THE HOUSE HAS NOT BEEN IMPACTED BY THE DRYWALL AND DOES NOT NEED TO BE REPLACED.

30. The primary concern with respect to the electrical system is the generation of heat that can give rise to damage and potentially a fire in the house. (Beyler Tr., 20:20-21:1.) Heat is generated throughout an electrical system, and the goal is to manage those temperatures so that they are not destructive or lead to glowing connections that may start a fire. (Beyler Tr., 21:2-17.) Resistance in electrical components governs how much heat may be generated in a connection or device. (Beyler Tr., 19:4-7.)

31. As Plaintiffs' experts admit, Sandia National Laboratories has performed resistivity testing to measure the impact on electrical wiring of receptacles from houses with Chinese drywall and found them to be normal. (Tr. Vol. I, 88:11-15; Tr. Vol. II, 270:2-8; Beyler Tr., 16:3-12; Hernandez Ex. 60-0019-0020.)

32. Mr. Krantz tested electrical wiring and found resistance to be low, consistent with the CPSC. (Tr. Vol. II, 270:2-13.) Mr. Krantz's testing included low-voltage wiring and confirmed that resistivity on such wiring also was low. (Vol. II, 270:16-19.)

33. Other than the limited resistivity testing by Mr. Krantz, Plaintiffs have not performed other testing on electrical wiring or devices. (Tr. Vol. I, 87:22-88:3, Tr. Vol. II, 270:14-15, 340:4-9.) Mr. Krantz did not perform any fitness of service calculations to determine mechanical integrity. (Tr. Vol. II, 267:8-10.) Mr. Krantz did not perform a statistical analysis of pit depth to determine rate of growth. (Tr. Vol. II, 265:15-18, 265:24-266:2.)

34. Corrosion exists on wires in the form of copper oxide. (Tr. Vol. I, 87:2-7.) Other foreign materials such as paint and joint compound exist on copper wiring. (Tr. Vol. I, 86:19-24; Tr. Vol. III, 274:1-15.) While Plaintiffs point to the existence of corrosion in the form of copper sulfide, they cannot identify a definitive risk for when the copper wiring will fail or continue corroding. (Tr. Vol. I, 91:7-15; Tr. Vol. III, 262:3-5, 12-14.)

35. Sulfide corrosion on electrical wires in the Hernandez house has not impacted their functionality, and they do not need to be removed. (Tr. Vol. III, 560:12; Tr. Vol. V, 882:25-883:7.)

36. Two things are important in assessing the functionality of a wire that has been subject to tarnishing. One is its continued current carrying capacity (resistivity), and, the second is the amount of material available to do so without generating heat (resistance). (Tr. Vol. III, 591:1-7, 592: 21-593:3.) Resistivity is a fundamental property of the material. Resistance is the current carrying capacity. (Tr. Vol. III, 597:6-7.)

37. The resistivity of copper is known. (Tr. Vol. III, 589:6-7.) It is an intrinsic property of copper. (Tr. Vol. III, 590: 11-13, 591:22-24.) Resistivity of copper is not impacted by an external corrosion process. (Tr. Vol. III, 591:1-7.)

38. Whether the resistance of copper wire may be impacted by corrosion or a tarnish layer is determined by the combination of the known resistivity of copper and the amount of material available to carry the current. (Tr. Vol. III, 592: 21-593:3.) Based on the loss of wire cross-section, current carrying capacity of a wire is not impacted until 50% or more of the cross-section is lost due to corrosion. (Tr. Vol. III, 598:13-19.)

39. Cross-sectional samples of wires harvested from the Hernandez house demonstrate that there is no impact to the current-carrying capacity of the wires, nor is there a concern regarding mechanical breakage of the wires because there is no significant impact to the cross-section of the wire. (Tr. Vol. V, 840:17-841:3, 841:6-842:12, 842:17-843:13, 850:7-851:3, 853-16-23, 907:15-19, 908:18-909:16; DX 136; DX 137, DX 138; DX 142; DX 143; DX 144; DX 149.)

40. Because the loss of cross-sectional material on wires from the Hernandez house and other houses with Chinese drywall was insignificant, the surface tarnishing does not change the resistance of the wires. (Tr. Vol. III, 590: 8-11, 593:4-6.)

41. Dr. Craig Beyler confirmed this conclusion and that there was no fire safety risk by assessing whether tarnish on connections and wires resulted in any temperature rise sufficient to impact functionality. (DX 9-0024.) This sort of testing is exactly what Plaintiffs' expert Dr. Galler thought may be necessary to tell the whole story, but apparently did not do himself. (Tr. Vol. II, 344:19-345:13.)

42. Dr. Beyler studied real world applications, measuring the performance of electrical installations using wires previously tarnished from exposure to Chinese drywall by examining temperature increases across the external electrical contacts of receptacles while placed under electrical load. (DX 0009-0024.) Dr. Beyler assessed whether tarnish on the wires resulted in any temperature rise sufficient to impact functionality or create a fire safety risk. (DX 0009-0024.)

43. To do so, Dr. Beyler conducted a series of temperature tests. The first test examined whether wires with existing sulfide corrosion, when connected to new receptacles and switches, conformed to the Underwriters Laboratories ("UL") standard for the operational safety of newly manufactured receptacles. (Beyler Tr. 21:18-22:23; DX 0009-0024 and 0029; Hernandez 660.)

44. A receptacle is certified by UL as operationally safe if it can be operated at its rated current without undergoing a temperature increase greater than 30 degrees Celsius. (DX 009-0024.)

45. Dr. Beyler used the UL standard for the safe operation of new receptacles as a conservative measure of performance in a house. (Beyler Tr., 25:6-23, 26:9-17; DX 009-0024.) If the newly connected receptacles passed the UL certification, they should be acceptable for use in the Hernandez house.

46. Pursuant to UL 498, Dr. Beyler tested the temperature rise of wire exemplars that had been subjected to parts per million levels of hydrogen sulfide and then attached to new receptacles. (Beyler Tr., 27:7-28:2, 28:14-29:09; DX 0009-0029.) The receptacles were then subjected to the rated capacity of the wires for a period of time and temperature rises were measured. (Beyler Tr., 31:5-17.)

47. The temperature rises measured were well below the UL standard of less than a 30 degree Celsius rise for connections to new receptacles. (Beyler Tr., 36:13-37:6; DX 0009-30, Table 2.)

48. Dr. Beyler also conducted temperature testing on ground wires from receptacles harvested from houses containing Chinese drywall, including three receptacles harvested from the Hernandez house. (Beyler Tr., 29:11-21; DX 0009-0031 and 0033; DX 217; DX 218; DX 00236 (physical exemplar).) Ground wire testing was performed to determine whether a wire corroded by the actual conditions in a house containing Chinese drywall connected to a new receptacle would operate in a manner sufficient to satisfy the UL standard for new receptacles. (Beyler Tr., 39:17-41:10.)

49. In these ground wire temperature tests, Dr. Beyler measured both the connection to the existing receptacle and the connection to the new receptacle to confirm that the existing receptacle did not transfer heat to the test end of the wire. (Beyler Tr., 44:17-46:8.) The test results confirmed, with the exception of an already loose wire, that the connections on field samples with existing corrosion on wires resulted in temperature rises below the 30 degree Celsius standard set by UL for new receptacles. (Beyler Tr., 49:1-12, 50:7-51:14, 110:8-111:9; DX 0009-0032, Table 3.)

50. Ground wire temperature testing was conducted on the same wires harvested from houses containing Chinese drywall, including the Hernandez house, before and after they were cleaned with a Scotch Brite pad. (Beyler Tr., 46: 16-23; DX 0009-0031.)

51. There was not a significant difference in temperature rises measured at the connections pre-cleaning or post-cleaning. (DX 0009-0032, Table 3.) These tests confirm that cleaning the tarnish from a wire did not make a significant difference to the wire's operation at the contact point, because the act of screwing down the new connection cleaned the corrosion from the wire and assisted in making a good connection. (Beyler Tr., 37:7-38:2, 49:20-50:6.)

52. In sum, Dr. Beyler's first two tests confirm that existing wire in houses that have Chinese drywall can be used to make good, safe and effective connections to receptacles. (Beyler Tr., 51:15-52:2; DX 0009-0032, Table 3; Hernandez 59-0009 (Gill and Trotta Report for CPSC "51-Home Study").) KPT's repair plan, which calls for leaving the wires in the house and using them to make connections to new receptacles and switches, will result in safe and effective connections that will last the life of the building. (Beyler Tr., 62:14-63:1.)

53. Dr. Beyler then performed a third temperature test on bare, insulated and sheathed wires to determine whether the heat generated during normal use of the new and tarnished wires were the same. (DX 0009-0034.) Dr. Beyler applied the same testing procedure set out in UL 498. (Beyler Tr., 52:3-54:10.) Dr. Beyler used the rating for insulation for NM wires of 90 degrees Celsius as a reference for the temperature testing of wires. (Beyler Tr., 54:14-55:3.

54. The temperature tests of bare wires demonstrated that temperature rise was between 10 to 18 degrees Celsius, well below the 90 degree Celsius rating established for insulation. (Beyler Tr., 57:19-58:4; DX 0009-0034, Table 4.) The wires are therefore carrying current as they were designed to do without producing excessive heat. (Beyler Tr., 57:24-58:4.) This testing further confirms that the current carrying capacity of the bare wire had not been degraded by the tarnishing. (Beyler Tr., 57:24-58:4.) The wires with corrosion and new wires were comparable. (Beyler Tr., 58:5-7.)

55. The temperature tests on insulated wires and within the sheathed portion of the NM cabling resulted in the same conclusion. (Beyler Tr. 58:21-59:9, 59:19-60:7, DX 0009-0035-6.) There was no significant difference between field samples and new wires. (Beyler Tr., 59:10-59:18, 60:8-10, DX 0009-0035-36.) Based on the testing of the insulated and NM sheathed wires, the tarnishing had no measurable effect on temperatures and the current carrying capacity of the wire. (Beyler Tr. 61:3-61:10, DX 0009-00035-0036.)

56. Consistent with the CPSC's determination that electrical insulation acts as a barrier to corrosive gases and protects the underlying copper, Mr. Rutila, Mr. Krantz and Dr. Perricone demonstrated that the insulated sheathing on hot and neutral copper wires protects the copper wire from corrosion, except in rare cases where there is damage to the insulation. (Tr. Vol. I, 89:2-11; Tr. Vol. II, 262:5-263:8, 263:21-25, 264:11-14; Tr. Vol. V, 836:7-13, 838:1-6, 839:1-4, 839:22-8:40:12; DX 134; DX 152, DX 153; Hernandez 59-0012 (Gill and Trotta Report for the CPSC "51-Home Study"; Hernandez 60-0022 (Sandia National Laboratories Report for the CPSC "51-Home Study". *See also*

DX 1(B) examination of insulated wires harvested from Louisiana and Virginia houses with Chinese drywall.)

57. Plaintiffs' reliance on the Battelle standard to determine impacts to electrical devices was misplaced and misapplied because the standard is used in industrial environments where there is *continuous corrosion*. (Tr. Vol. II, 251:21-252:12, 252:13.) After the drywall is removed, the environment in the Hernandez house is no longer corrosive and the standard has no bearing. (Tr. Vol. V, 833:16-834:2.) The Battelle standard further requires the corrosivity of the environment to be measured using a reactivity coupon, not the electrical component itself. (Tr. Vol. V, 833:10-15, 905:21-906:2.) Plaintiffs did not analyze samples as required under this standard, or other similar standards, which is usually done by cathodic reduction on copper reactivity coupons. (Tr. Vol., II, 252:13-255:13; DX 65; Hernandez 62.) Instead, Plaintiffs use film thicknesses on wires or other copper components purportedly prepared according to metallographic standards, but many of the measurements were performed improperly, cannot form the basis of an opinion and shed doubt on the technique as a whole. (Tr. Vol. II, 251:7-20; Tr. Vol. V, 879:23-882:7.)

58. The Court finds that while there may be tarnishing or corrosion on the copper wiring in the Hernandez house, there is no showing that the wiring has been damaged such that it would require replacement, even where surface tarnishing occurred under the insulation. The existing copper sulfide corrosion product does not reduce the functionality of the wires at contacts and there is no significant reduction in cross-sectional material that would result in any impact to the wires' current carrying capacity.

VI. THE FUNCTIONALITY OF COPPER PLUMBING HAS NOT BEEN IMPACTED BY THE DRYWALL AND DOES NOT NEED TO BE REPLACED.

59. The corrosion on the outer surface of the pipes is superficial, has not affected their performance and will not create a significant change in material properties. (Tr. Vol. III, 558:18-25; Tr. Vol. V, 852: 18-853:3 and 16-23.)

60. The copper pipe from the Hernandez house shows that there is greater corrosion occurring inside the pipe as a result of its everyday use and what is being transported in the water through the pipes. (Tr. Vol. V, 860:24-861:7, 865:5-11; DX 1(A-2)-0147; DX 157-DX 159.) There is minimal sulfide corrosion on the exterior and no sulfide, but more extreme corrosion on the interior. (Tr. Vol. III, 555: 18-19; Tr. Vol. V, 861:18-862:21, 864:6-865; DX 159; DX 160.)

61. The rate of corrosion outside the pipe is relatively minor tarnishing compared to the rate of attack inside the pipe. The attack inside the pipe is two to five times more aggressive. (Tr. Vol. III, 555:21-556:1; DX 158, DX 159.)

62. The outer tarnish layer of the copper pipe from the Hernandez house does not come close to impacting the underlying copper by enough of a percentage to affect the mechanical property of the pipe. (Tr. Vol. III, 560:4-6, DX 158, DX 159.)

63. Cross-sections of copper plumbing from houses with Chinese drywall, when compared to new copper plumbing, are consistent with what was observed in the Hernandez house and do not show significant intrusion of copper sulfide corrosion product that would impact its operation. (Tr. Vol. V, 853: 16-23, 868:3-7, 868:19-21, 872:8-13, 873:5-8, 874:19-875:5, 875:22-876:3; DX 125A; DX 125B; DX 164; DX 165; DX 166; DX 168, DX 169; DX 170; DX 171; DX 174; DX 175; DX 177.) The

irregularities on the exterior of new pipes are the same as those from houses with Chinese drywall. (Tr. Vol. V, 874:19-875:5; DX 175.)

64. No evidence of pinhole leaks or pitting that would damage the functionality of copper plumbing exists. (Tr. Vol. V, 875:6-11.)

65. No significant intrusion of corrosion into the brazing of a pipe from the Hernandez house, which is used to connect the copper pipes, was ever shown that would in any way compromise the structural integrity of the joint. (Tr. Vol. V, 865:16-867:12; DX 160; DX 161.)

66. As with wires, the mechanism of copper sulfide tarnishing on exposed copper pipes requires the presence of hydrogen sulfide. (Tr. Vol. III, 547:13-548:1; Tr. Vol. V, 852:18-853:3, 854:17-855:3.) If the source of hydrogen sulfide is removed, the copper sulfide film on the pipes will stop reacting and no further sulfidation will continue, even with moisture in the air. (Tr. Vol. III, 553:14-23.)

67. Once the source of hydrogen sulfide has been removed, the only corrosion process that will occur on the surface of the pipes in the Hernandez house is what happens on such material normally. (Tr. Vol. III, 554:5-6.) The modicum of continued atmospheric corrosion due to the normal way pipes function will take hundreds of years to effectively build up any significant corrosion on the material. (Tr. Vol. III, 557:3-7) Even if corrosion product remains after cleaning, it will not have any significance as a source of continued corrosion. (Tr. Vol. V, 876:4-16.)

68. Plaintiffs cannot identify any definitive risk for when or if the plumbing will fail as a result of sulfide tarnishing on the pipes. (Tr. Vol. I, 91:7-15.)

69. The Court finds that there is no damage to the functionality of copper plumbing in the Hernandez house that would require its removal.

VII. "PITTING" DOES NOT IMPACT FUNCTIONALITY OF WIRES OR PIPES OR RESULT IN CONTINUED SULFIDE CORROSION.

70. The surface tarnishing seen on exposed copper wires and pipes is not a typical "pitting corrosion," but is the rounding out of imperfections in the material or results from exposure to more surface area. (Tr. Vol. III, 564:8-23.) Exposed copper in the Hernandez house shows relatively uniform surface tarnishing, resulting in a two to five micron loss of cross section in the material, as well as what some people are describing as pits in the range of 10 to 20 microns deep. (Tr. Vol. III, 583:14-17.)

71. Cross-sections of the wires (measured in millimeters) puts the size of these "pits" into context: 30 microns (or .03 millimeters), which is less than half the thickness of a human hair. The cross sections emphasize how small the "pits" are compared to the overall cross-section of the material. (Tr. Vol. V, 913:20-914:9; DX1(A-1)-0065-0074.)

72. The mere presence of these "pits" at the reported depths does not impact the functionality of the wires. (Tr. Vol. V, 857:19-858:8.) Twenty or 30 micron pits are superficial on a wire or pipe in the Hernandez house. (Tr. Vol. III, 583:10-21.) The wires in the Hernandez house are in between one and two millimeter thickness. (Tr. Vol. III, 584:8-9.) The loss the wire's cross-section caused by "pits," measured in microns, is superficial on a wire with a one to two millimeter thickness. (Tr. Vol. III, 584:11.)

73. Trace amounts of copper sulfide may remain in "pits" on wires that are cleaned, but sulfide corrosion will not continue once the source is removed, even if copper sulfide is left in a "pit." (Tr. Vol. III, 585:11-12, 585:25-586:2; Tr. Vol. V, 851:13-852:1.)

74. No evidence of "pits" on copper plumbing that might damage the functionality of the plumbing was found. (Tr. Vol. V, 875:9-11.) "Pits" on copper plumbing have not behaved any more aggressively than those on wires and would not continue without a continuing source of hydrogen sulfide to continue the reaction. (Tr. Vol. V, 862:2-21.)

75. The Court finds that "pitting," to the extent it has occurred on wires and plumbing, is insignificant and does not raise a concern with the functionality of copper wires or plumbing. The Court also finds that the pits do not contribute to continued sulfide corrosion.

VIII. CLEANING OF WIRES AND PIPES IS NOT NECESSARY BUT MAY BE DONE BY NORMAL MEANS AND METHODS.

76. There is no reason to remove the tarnish film from exposed areas of wiring or plumbing to ensure the continued operation of those components. (Tr. Vol. V, 883:20-884:3.)

77. To the extent that an electrician, plumber or building code official requires cleaning, it can be done. (Tr. Vol. V, 852:7-16.) The black tarnish on the copper pipes can easily be wiped off with a wet rag. (Tr. Vol. III, 707:19-20; Tr. Vol. V, 845:16-846:6, 846:25-847:6.)

78. Tarnish films left on wires or pipes after cleaning are not a concern with respect to their continued functionality. (Beyler Tr., 99:21-102:1; Tr. Vol. V, 848:20-849:7.) There is no significance to these materials in leaving behind sulfide tarnish if the source of the hydrogen sulfide is removed. (Tr. Vol. V, 876:4-20.)

IX. PLAINTIFFS HAVE PRESENTED NO EVIDENCE THAT SILVER CONTINUES TO CORRODE AFTER REMOVAL OF THE SOURCE.

79. Plaintiffs have not presented any testimony or evidence that corrosion of silver would continue after the drywall is removed. The Edwards paper – the sole basis for Plaintiffs' expert's opinion that corrosion will continue after removal of the source – is limited to the impacts of potable water, including sulfide, on copper pipes. (LT 241.)

80. The Court finds no basis that electrical components or devices containing silver need to be replaced because of the potential for continuing corrosion as Plaintiffs presented no factual support for their claim that silver would continue to corrode in the absence of the drywall.

X. THE PLAINTIFFS' HVAC SYSTEM SHOULD NOT BE INCLUDED IN THE SCOPE OF REPAIRS BECAUSE IT HAS RECENTLY BEEN REPLACED AND IT IS NOT DAMAGED.

81. Plaintiffs' HVAC system should not be included in the scope of repairs for the Hernandez house because the coils and compressor have recently been replaced. (Tr. Vol. I, 72:21-73:2; DX 195.)

82. Plaintiffs' witness, Mr. Rutila, admitted that there is "probably not much risk in keeping it" since it has not yet gone through a significant heating and cooling season. (Tr. Vol. I, 72:22-24.)

83. Plaintiffs provided no scientific evidence of failure of the HVAC system. Mr. Krantz, for instance, did not perform any line testing or sampling on the Hernandez house. (Tr. Vol. II, 270:20-271:2; DX 232.) Mr. Rutila and Mr. Krantz both acknowledged that the line set from the Hernandez house had no significant corrosion. (Vol. I, 85:2-13; Vol. II, 271:3-8.)

84. Plaintiffs' experts also personally examined the HVAC system in the Hernandez house and did not observe any damage. (Tr. Vol. III, 706:9-21.) Mr. Fuselier noted that the HVAC coils were new, and that the blower motor was in good working order with no signs of debris on it. (Tr. Vol. III, 706:17-18.) Mr. Fuselier also noted that that the HVAC unit's electrical contactors were completely clean. (Tr. Vol. III, 706:18-19.)

85. The Court finds that Plaintiffs have not demonstrated that the HVAC system needs to be replaced again, and it should not be included in the repair estimate.

XI. APPLIANCES AND OTHER DEVICES AND PERSONAL PROPERTY WITH ELECTRICAL CIRCUITS HAVE NOT BEEN SHOWN TO FAIL AND CANNOT BE PREDICTED TO FAIL WITH ANY REASONABLE CERTAINTY, AND THEREFORE SHOULD NOT BE REPLACED.

86. Plaintiffs submitted a 1006 summary of items to recover, but they provided no evidence at trial to demonstrate a causal link between drywall and item failure or even to substantiate the failure in all cases. (Tr. Vol. II, 298:11-25.) Mr. Rutila testified that he was not able to confirm a link between the copper sulfide and silver sulfide and the failure for devices and appliances that he examined – he did not reverse engineer the process to figure out what was going on. (Tr. Vol. I, 90:6-14.)

87. Dr. Galler, performed root cause analysis on only one item in the Hernandez house – a hairdryer. (Tr. Vol. II, 338:4-10.) He admits that the switch of the hairdryer also had grease on it. (Tr. Vol. II, 337:25-338:3.) Besides the hairdryer, Dr. Galler did not attest to failure of any other specific items in the Hernandez house.

88. Plaintiffs cannot identify with any reasonable certainty when appliance or electrical device failure would occur in the future. (Tr. Vol. II, 331:22-332:1, 338:24-339:1.)

89. Ray Phillips has confirmed that Beazer has had no incidence of claimed electrical component failures in any of the properties Beazer is repairing. (Tr. Vol. I, 191:18-20.)

90. There is no evidence to support the potential failure of the circuit breaker in the Hernandez house. Mr. Rutila acknowledged that the copper wiring on the circuit breaker, which is located in the laundry room of the Hernandez house, appeared untarnished. (Tr. Vol. I, 85:18-86:2; DX 234.) Dr. Galler identified limited 10 micron size piece of copper sulfide on the circuit breaker surface in support of his opinion that it might be impacted although he cannot testify as to when. (Tr. Vol. II, 338:15-339:1.) Spotty, localized copper sulfide on the surface of the contact will not affect the performance of the circuit breaker. (Tr. Vol. III, 561:4-21.)

91. The Court finds that there is insufficient evidence to link any failure of appliances or electronic devices in the Hernandez house to the drywall. Plaintiffs also have not demonstrated that such devices will fail once the source is removed, and they do not need to be replaced.

XII. THE PLAINTIFFS HAVE NOT ESTABLISHED THAT OTHER PERSONAL PROPERTY HAS BEEN DAMAGED AS A RESULT OF EXPOSURE TO DRYWALL AND HAVE IMPROPERLY USED REPLACEMENT COST TO VALUE SUCH PROPERTY.

92. Plaintiffs have not established that other non-electronic personal property has failed or been damaged as a result of exposure to Chinese drywall.

93. There is no testimony from Plaintiffs' experts that the functionality of other personal property in the Hernandez house was impacted.

94. Moreover, Plaintiffs' have not considered their use of the property over the past three years in valuing it for damages purposes. Donald Maloney submitted

testimony by way of trial deposition with respect to the personal property damages. Mr. Maloney was directed by Plaintiffs to provide the replacement cost for new items for all values that he considered. (Maloney Tr. 21:22-23:15.) Mr. Maloney did not consider the use of the items by calculating a fair market value for personal property in the Hernandez house, which includes depreciation for use. (Maloney Tr. 55:3-10, 62:13-16, 66: 21-24.) Because he did not calculate fair market value, Mr. Maloney's estimates are inflated and cannot be considered.

XIII. THE PLAINTIFFS HAVE FAILED TO ESTABLISH THAT TEARING THE HOUSE DOWN TO THE STUDS IS BOTH NECESSARY AND COST EFFECTIVE.

95. No scientific evidence supports a finding that the current or future functionality of the electrical wiring or plumbing in the Hernandez house has been compromised such that it needs to be replaced. This Court finds that KPT's repair protocol is supported by the scientific evidence and will effectively repair the Hernandez house.

96. KPT's protocol will remove and replace the drywall in the house. (DX 211.) The protocol includes the removal of certain components including switches, outlets and safety devices, evaporator coils, and flexible ductwork. (DX 211.) The protocol also includes the removal of carpet, granite countertop, protection and storage of cabinets, counters and doors, removal of insulation and HVAC non-metal ducting, and the removal and storage of toilets and light fixtures. (Tr. Vol. III, 682:9-13; Tr. Vol. IV, 754:5-755:4; DX 211.) KPT also will replace any fixtures damaged during drywall removal and will install new receptacles and switches. (Tr. Vol. III, 682:9-13; DX 211.)

97. KPT's repair protocol enables the contractor to assess whether any additional house components must be replaced because of damage caused by the removal

of the drywall during the repair process. (DX 211.) The Carubba cost estimate takes these possibilities into account. (DX 237.)

98. The KPT protocol also allows an electrician to make a new connection between wires left in the house and receptacles, if the electrician deems it necessary. (DX 211.) A general electrician is sufficiently competent to make this determination. (Tr. Vol. III, 682:3-683:12.) The Court finds that no corrosion expertise is necessary.

99. Removal of drywall during the repair process will cause some dust to be dispersed inside the house. The KPT protocol adequately addresses this issue in the Hernandez house by controlling the method of drywall removal, and carefully vacuuming and wiping down the remaining components and surfaces of the house following drywall removal. (Tr. Vol. IV, 750:15-16, 799:19-22; DX 211.)

100. The use of a Shop vac, a commercially available vacuum, with a specially designed drywall vacuuming bag, is sufficient to remove any remaining drywall dust generated during removal, but HEPA vacuuming also may be considered. (Tr. Vol. III, 562:14-25; Vol. IV, 752:14-22; DX 211.)

101. Except for the use of HEPA filters in the vacuuming process, KPT's proposed cleaning process is consistent with the cleaning process proposed by Plaintiffs' experts. (Tr. Vol. II., 382:2-6.)

102. Neither Plaintiffs' nor KPT's experts support power washing the house following drywall removal, which is one step in the process being followed by Beazer. (Tr. Vol. I, 93:1-9; DX 211.)

103. Following the removal of drywall and the cleaning process, no scientific evidence was presented that an air-out period was necessary. At best, Ronald Bailey,

suggested an air-out period of seven to ten days based on his limited experience in a few repairs where the proposed cleaning protocol was not followed and hearsay information from one Florida homebuilder on their practice. (Tr. Vol. II, 383, 7-19, 388:10-16.) An even longer period of time, such as two to three weeks, or longer, is not supported by any scientific evidence. (Tr. Vol. I, 191:13-17; Tr. Vol. II, 488:6-15.)

XIV. THE PLAINTIFFS' HAVE FAILED TO ESTABLISH THAT THE SIX-INCH RULE JUSTIFIES TEARING DOWN THE HERNANDEZ HOUSE TO THE STUDS TO REMOVE ALL ELECTRICAL WIRING.

104. The electrical code's provision regarding six inches of free wire in boxes is not commonly used by electrical contractors in the New Orleans area. (Tr. Vol. III, 701:14-17.)

105. The six-inch rule, which Plaintiffs claim requires the electrical wiring to be entirely replaced, is not applicable in the Hernandez house because the electrical boxes in the house, as in most residential properties, have an opening of eight inches or less. Only three inches of wire are required to protrude outside the box. (Tr. Vol. III, 619:5-9; DX 239; DX 240.) In the thousands of inspections that KPT's electrical engineering expert has performed on residential properties, he has never denied an inspection on the grounds that there were not six inches of excess wire from the back of the box. (Tr. Vol. III, 619:16-620:3; DX 37-0002.)

106. KPT's repair protocol, which allows for the clipping of wires if deemed by an electrician to be necessary to form an appropriate connection, is not in violation of the code. (Tr. Vol. III, 618:16-20.) Cleaning, which is also a possibility under KPT's protocol if it is deemed appropriate by the electrician, is possible as the tarnish layer on the exposed wire can be wiped off. (Tr. Vol. III, 619:1-2, 681:1-682:2; DX 211.)

XV. THE PLAINTIFFS HAVE FAILED TO ESTABLISH WHY THEIR MORE EXPENSIVE PROTOCOL, WHICH IS BASED ON A COMPUTER ESTIMATE AND NOT REAL-WORLD DATA, IS JUSTIFIED.

107. Without scientific justification for the removal of the current electrical wiring or plumbing in the Hernandez house, the choice of repair is properly decided by the contractor that will engage in the work. (Tr. Vol. I, 82:7-13.)

108. The cost estimate offered by KPT's contractor is significantly lower than the Plaintiffs' estimate, even when certain line items that are unnecessary to repair the Hernandez house are removed.

109. Roy Carubba, a licensed professional engineer and general contractor in Louisiana, has considerable experience in the repair of residential properties in the New Orleans metropolitan area. (Tr. Vol. IV, 727:4-21.) Mr. Carubba is the sole proprietor of Carubba Engineering and has been in business for over 17 years. (Tr. Vol. IV, 728:11-12.) Mr. Carubba's construction company renovated approximately 25 single-family residences that were damaged by flooding and wind brought on by Hurricane Katrina. (Tr. Vol. IV, 731:3-8.) The Court finds that Mr. Carubba's experiences in the Katrina aftermath are relevant because even after the catastrophic impacts experienced from the flooding, Mr. Carubba used normal means and methods to repair homes – not the extraordinary methods suggested by Plaintiffs. (Tr. Vol. IV, 734:19-25.)

110. Mr. Carubba has been involved in the estimation of the cost of repair of residential properties impacted by corrosion in their electrical systems on hundreds of occasions. (Tr. Vol. IV, 736:9-14.)

111. Unlike Mr. Mallet, who misapplied a computer software program called Xactimate to determine his cost estimate for the Hernandez house, Mr. Carubba sought

estimates from actual, local subcontractors who provided their estimates based upon their fields of expertise and practice experience. (Tr. Vol. IV, 731:13-15, 732:3-5; DX 212; DX 213; DX 215.) Mr. Carubba also inspected the property himself as a general contractor and as an engineer. (Tr. Vol. IV, 731:23-25.)

112. In order to determine the cost of repairing the Hernandez house, Mr. Carubba assembled a team of experienced New Orleans tradesmen, which included Bruce Fuselier of Bruce's Plumbing, Mark Hartenstein of GraciHart Electric and Ishmael Jimenez, an experienced carpenter (Tr. Vol. IV, 737:14-18.) Mr. Carubba also had employees at his company assist him in putting together the cost estimate for repairing the Hernandez property (Tr. Vol. IV, 737:19-22.) They inspected the house on February 24th and assisted Carubba in producing his report based upon their respective expertise. (Tr. Vol. IV, 738:2-21.) From the inspection, Carubba and his team were able to determine the scope of the repair that needed to be undertaken. (Tr. Vol. IV, 738:16-21.)

113. Mr. Carubba observed tarnish on the exposed portions of the electrical wiring, but those portions looked new once the insulation was pealed back. (Tr. Vol. IV, 741:20-24.) With regard to the exposed portions of the wire, Mr. Carubba noticed that the tarnish came right off when he touched it with his thumb (Tr. Vol. IV, 742:2-7.)

114. In addition to his inspection of the Hernandez house with his team of tradesmen, Mr. Carubba had a telephone call with Dr. Matthew Perricone and Mr. Alex Locay, a general contractor in Florida with experience in Chinese drywall residential remediation. (Tr. Vol. IV, 743-44.) Mr. Carubba also reviewed the reports of Dr. Perricone and Dr. Beyler before formulating the scope of the repair work for the Hernandez house. (Tr. Vol. IV, 745:12-20.)

115. Mr. Carubba set up a drywall demolition exercise in an unoccupied townhouse in Mandeville, Louisiana on February 25th and 26th containing KPT drywall. (Tr. Vol. IV, 746:15-21.) The purpose of the exercise was to determine if dust resulting from a drywall demolition could be adequately cleaned up. (*Id.*) The drywall demolition and clean up that was being proposed by Mr. Carubba was followed by the workmen at that townhouse. (Tr. Vol. IV, 747:12-15.) A videotape of the proposed protocol being undertaken in one room of the townhouse was provided, and Mr. Carubba described the process of using utility knives to remove the drywall as a normal demolition process. (Tr. Vol. IV, 748:22-749:7.)

116. KPT proposed a more controlled method of removing the drywall in the Hernandez house that involved using utility knives rather than the uncontrolled hammer and pull method of demolition suggested by Mr. Phillips of Beazer. The method of using the utility knife was commonly used after Hurricane Katrina. (Tr. Vol. IV, 748:21-749:21.) The Court finds that this method is a more reasonable and efficient method and means of controlling the dust that arises out of the removal of drywall during renovation of the Hernandez house.

117. KPT also recommends the wiping down of the wooden studs and other remaining components after the removal of the drywall. (Tr. Vol. IV, 752: 3-8.)

118. The scope of work that was formulated by Mr. Carubba was based upon the opinions of scientific experts, the recommendations of the experienced tradesmen that he retained and his own experience. (Tr. Vol. IV, 753:24-754:12).

XVI. THE PLAINTIFFS' RELIANCE ON A HOMEBUILDER'S SCOPE OF REMEDIATION IS MISPLACED, AS THE HOMEBUILDER'S REPAIR SCOPE IS BASED ON BUSINESS CONCERNS RATHER THAN SCIENCE, AND THEREFORE OVERESTIMATES THE COST OF NECESSARY REPAIR.

119. Plaintiffs proffered Ray Phillips, the Vice President of Operations for the Florida division of Beazer Homes, a national home builder. (Tr. Vol. I, 98:20-21.). While Mr. Phillips had extensive years of experience in the construction and national home building industries, his first experience in Chinese drywall remediation began in August of last year, about six months before the trial. (Tr. Vol. I, 99:11-12; 193:25-194:1.)

120. The Court finds that Beazer's scope of repair for houses with Chinese drywall is driven by business objectives, not science. The main purpose behind Beazer's repair protocol was to honor its contractual warranty to its customers, protect its national brand and avoid the threat of possible litigation. (Tr. Vol. I, 105:19-21; 190:13-17.) For example, Beazer's protocol calls for replacement of all appliances despite none of the appliances having actually failed in the forty-four properties it is investigating with Chinese drywall. (Tr. Vol. I, 191:18-20.) Phillips admitted that if Lennar had already decided to replace all appliances, it would be an additional business challenge to explain its customers why it developed a protocol that did not call for replacing such appliances. (Tr. Vol. I, 193:10-22.)

121. Many of the decisions that Beazer made during the course of developing its protocol were influenced by a cost-benefit analysis rather than based upon any scientific evidence of an impact to a component of the house that would necessitate its replacement. Moreover, many of the cost-benefit decisions that Mr. Phillips made when developing the Beazer protocol have been agreed to by both parties. (Joint Stipulation,

March 12, 2010, ¶ 4.) Only for purposes of this proceeding, both parties agreed that carpeting should be replaced because of its inexpensive cost and the likelihood of damage during the repair, not science. (Tr. Vol. I, 113:13-21.) The parties have also agreed that the flexible ductwork of the HVAC, which constituted 95% of the ductwork in Beazer properties, should be replaced in the circumstances of the Hernandez house on a cost-benefit basis, just as Mr. Phillips did. (Tr. Vol. I, 113:1-6.)

122. The Court further notes that Beazer has demanded that the homeowners release it from liability for property damage and give Beazer an assignment of any claims that the homeowner has against the manufacturer or other parties involved in the installation of Chinese drywall. (Tr. Vol. I, 109:9-110:7.) Given the assignment of claims to Beazer, there is an inference that Beazer would be more inclined to agree to additional repairs or replacement of certain components that were not necessarily impacted.

123. While Mr. Phillips' testimony was informative, his testimony was by no means controlling. Beazer's experience in repairing homes in which Chinese drywall has been installed is limited. Beazer has had Chinese drywall reported in only two developments in which they were involved, Magnolia Lakes in Fort Myers, Florida and Hampton Lakes in Tampa, Florida (Tr. Vol. I, 100:20-25.) The Hampton Lakes development is a high end townhouse complex, not a single family community. (Tr. Vol. I, 101:3-8.) The Magnolia Lakes development is a single family development (Tr. Vol. I, 101:9-11.) Both were built in 2005-2006. Beazer started its repair program in August of last year, six months after Lennar had begun its repair program and retained the same environmental consultant as Lennar, Environ. (Tr. Vol. I, 193:1-3; 101:20-102:2.)

Beazer has signed up 31 homeowners to participate in their remediation program (Tr. Vol. I, 192:3-5.) Beazer has not completed the repair of any properties in its program but hopes to have two single family houses completed in two weeks and another six that will be completed in four more weeks. (Tr. Vol. I, 104:21-23; 105:2-4.)

124. In the Beazer protocol, Mr. Phillips decided to remove wood floors and wood cabinets because of a concern that the wood – when exposed to humidity in Florida – would warp. (Tr. Vol. I, 114:3-17). With respect to the Hernandez house, the cabinetry and other fixtures could be stored in the Hernandez garage during the repair of the house and could be adequately protected using dehumidifiers. (Tr. Vol. IV, 757:9-14.) The Court finds that KPT's methods would be more cost-efficient and would be effective especially given that Plaintiffs do not have the same buying power as Beazer in purchasing new cabinetry, flooring and fixtures that Beazer admittedly has as a national home builder. (Tr. Vol. I, 125:19-20; 164:14-21.)

125. Mr. Phillips raised the concern of tarnishing on the ground wire as a primary reason for replacement of the entire electrical system rather than clipping and cleaning the ground wire and replacing the switches and receptacles as KPT suggests. (Tr. Vol. I, 116:12-24; 139:1-140:25; 144:1-145:12.) The Court finds the testimony of Dr. Perricone, Dr. Richard Lee and Dr. Craig Beyler gives this Court more than a sufficient basis to determine that KPT's protocol is adequate and that the electrical system does not need to be replaced.

126. Mr. Hartenstein, a local New Orleans electrical contractor, undertook a careful and detailed inspection of the electrical system in the Hernandez house and

another impacted Chinese drywall house in Mandeville, and agrees that KPT's protocol is appropriate. (Tr. Vol. III, 680:23-682:19.)

127. Upon installing the new receptacles and outlets, Mr. Hartenstein proposes to clip off the exposed portions of the hot and neutral wires, and strip back those wires a quarter to half inch to make the new connections. (Tr. Vol. III, 682:9-17). This is not scientifically necessary based on Dr. Beyler's testing. The ground wire could be cleaned and may be clipped back to the same length as the hot and neutral wires for consistency. (Tr. Vol. III 693:18-21.) There is also no scientific basis for cleaning the ground wire. If an additional length of wire is needed to meet the applicable electric code, Mr. Hartenstein will add the required length of wire to the clipped portion of the existing wire with a wire nut. (Tr. Vol. III, 698:12-13.)

128. In Mr. Hartenstein's opinion, the Hernandez's house's existing electrical wiring does not need to be removed and can be reused. (Tr. Vol. III, 681:1-6.)

129. Beazer used PVC and polyvinyl or polychloride plumbing material for its Florida properties, so Beazer did not have extensive experience with the replacement of copper piping in order to make an informed decision with respect to removing the piping from houses that contain Chinese drywall. (Tr. Vol. I, 117:10-118:22.)

130. The Court finds that the dust from the drywall demolition can be controlled and adequately removed through the use of a standard shop or HEPA filter vacuum along with a wipe down of the studs and other remaining components if the drywall is taken in the Hernandez house. Plaintiffs introduced no objective evidence for the claim that any remaining drywall dust would be sufficient to cause continued

tarnishing of metals or odor in the home environment after clean-up. (Tr. Vol. I, 156:4-157:7.)

131. The cost summaries used on cross-examination of Mr. Phillips provide the Court with an apples to apples comparison. (DX 47; DX 48; DX 59; DX 50; DX 55.) The Court acknowledges that Beazer's status as a national builder may afford it better buying power than the individual homeowner would have when procuring repair costs of a home, but the Court does not accept that Beazer's buying power reflects a 17.5% discount as reflected by Mr. Phillips in this trial. (Tr. Vol. I, 164:3-165:19.) Instead, the Court finds that the 10% figure, as Mr. Phillips stated in his testimony in the *Germano* trial, and which he was reminded of during his cross-examination, is the more appropriate estimated buying power discount to be considered. (Tr. Vol. I, 186:2-25.) Although the Court recognizes that given present economic climate, it would not be unexpected for there to be a negotiation of lower margins especially from custom builders rather than builders with buying power.

132. Although Mr. Phillips believed an industry-wide standard of 10% profit and 10% overhead should be included in the estimate, the Court notes that the materials and equipment tax line items of 7.5%each for a total tax of 15% reflected in the cost estimate presented by Plaintiffs' expert, Alexis Mallet were unjustified.. As consistently reflected in the testimony of Mr. Phillips and Mr. Carubba any such taxes would be reflected in the sub-contractors' price quotes and actual invoices for the activities and materials they provided for the job. (Tr. Vol. I, 184: 8-23; Tr. Vol. IV, 764:23-765:16.) The addition of these line items in the Mallett cost estimate would constitute a double counting. (Tr. Vol. IV, 765:18-766:1.)

XVII. THE PLAINTIFFS' REPAIR COST IF $100 PER SQUARE FOOT IS GROSSLY OVERSTATED AND THE CORRECT COST OF REPAIR FOR THE HERNANDEZ HOUSE IS $26.10-$29.09 PER SQUARE FOOT.

133. Mr. Carubba estimates that it would cost between $54,142.43 and $58,564.93 – or between $26.10 and $29.09 per square foot – to repair the Hernandez house. (Tr. Vol. IV, 760:23-24; DX 212; DX 237.)

134. Plaintiffs' cost estimates for the repair of the Hernandez house hinge almost entirely on misapplication of a computer software program called Xactimate. Plaintiffs' general contracting expert, Alexis Mallet, concedes that "99 percent of [his] cost estimate is determined by Xactimate," (Tr. Vol. II, 478:1-3.), a tool used in insurance adjusting and not as a tool by general contractors in estimating the cost of a repair job.

135. The Court notes that certain line items in the Mallet cost estimate were particularly high when compared to the Carubba cost estimate, which might result in part from increasing Xactimate unit prices. For example, the demolition cost is double that of Mr. Carubba's, even though Mr. Mallet complained that Mr. Carubba's demolition approach was too meticulous and labor intensive. (Tr. Vol. IV, 768:14-17.) The cost of painting the house was exceptionally high when compared to the Carubba estimate and actual costs incurred by Beazer. (Tr. Vol. IV, 769:7-17; DX 47-50.)

136. The summaries that Mr. Phillips admitted were accurate give a better comparison of Beazer's costs than Mallet's for the repair of the Hernandez house. (DX 47, DX 48, DX 49, DX 50.) The actual cost per square foot for the Hernandez house – minus the relocation and moving costs, costs of preserving evidence, costs for retaining

Environ as the environmental consultant that are unique to Beazer – is between $26.10 and $26.16. (Tr. Vol. I, 187:11-23.)

137. If Beazer's buying power discount, overhead and profit are considered, the cost per square foot for repairs to the Borkowski property – which Plaintiffs claim is the most similar to the Hernandez house – is $40.04. (Tr. Vol. I, 187:1-10.)

138. Additionally, the Borkowski house was sold for $300,000 to $400,000 at or about the same time as the Hernandez house was build for $175,000. (DX 192; DX 193.) One could reasonably assume that the cost of repairs to the Borkowski house will be more costly than repairs to the Hernandez house. (Tr. Vol. I, 184:8-16.)

139. The temporary accommodation costs should be removed if trying to make a comparison with the cost estimate that Plaintiffs proffer, since Plaintiffs seek rental damages in addition to the repair cost number. The management fees should be deducted if the 10% overhead figure is added as Plaintiffs and Mr. Phillips suggest. The Environ costs should also not be included because they are litigation costs that are not a part of the repair of the house, which KPT has stipulated will be repaired.

140. Mr. Mallet's scope of work is identical to Beazer's but significantly exceeds Beazer's cost. (Tr. Vol. II, 480:7-13.) This shows that Mr. Mallet's Xactimate-determined cost estimate is not an accurate cost estimation for repairing the Hernandez house. The estimate is significantly inflated even if the Court were to presume that the entire Beazer protocol is to be followed.

141. The Court agrees with Mr. Carubba that the fixtures and the cabinetry can be stored in the garage during the repair of the house and the concerns of humidity can be alleviated through the use of dehumidifiers – as this was an effective method of

preserving woodwork and fixtures during repair work in the aftermath of Katrina. (Tr. Vol. IV, 757:8-758:7.)

142. Unlike Mr. Mallet's cost estimate, Mr. Carubba obtained actual quotes for materials and labor from the tradesmen who would be involved and who inspected the house. (Tr. Vol. IV, 763:8-764:4.) Rather than using a computer program used by the insurance industry and not by general contractors, Mr. Carubba employed the more reliable method for obtaining a cost estimate in that he phoned suppliers and sub-contractors and procured "real world real time prices." (Tr. Vol. IV, 789:12-13.)

143. The Court finds that Mr. Carubba's scope of work and the cost estimate that KPT proffers are reasonable and will adequately repair the Hernandez house.

XVIII. THE PLAINTIFFS' REPLACEMENT HOUSING COSTS SHOULD BE LIMITED TO THREE MONTHS.

144. Plaintiffs' replacement housing costs should be limited to three months. The Court agrees with KPT that the remediation will take approximately sixty days to complete. (Tr. Vol. IV, 759:7-11.) The Court also accepts the evidence submitted by KPT's appraisal expert, Richard Roddewig, which states that the rental costs for Plaintiffs will be between $1,200 and $1,800 per month. (DX 209; DX 221.) Mr. Roddewig determined his estimates by evaluating the rental market for properties comparable to the Hernandez property, and he did so with the assistance of Mr. P.M. McEnery, a Louisiana state- licensed appraiser. (DX 221.) The Court finds that Mr. Mallet's proposal of six months, or the eight months estimated by Beazer, are unreasonably high given KPT's more time-efficient repair protocol. .

XIX. PLAINTIFFS WITHDREW THEIR APPRAISAL EXPERT, KENNETH ACKS, FROM THE PROCEEDING AND HAVE NOT SUBMITTED EVIDENCE WITH RESPECT TO DEVALUATION.

145. Plaintiffs do not attempt to establish a diminution of property value claim. Initially, Plaintiff offered Mr. Kenneth Acks, an expert who purportedly would opine on the diminution of property value allegedly attributable to the presence of Chinese drywall in the Hernandez house.

146. On March 9, 2010, KPT filed a *Daubert* motion that challenged the qualifications and reliability of Kenneth Acks' report and testimony. The following day, March 10, 2010, Plaintiffs withdrew Kenneth Acks from the proceeding and offered no alternative evidence on alleged diminution of property value.

147. Although Plaintiffs' complaint included a diminution of value claim, they have proffered no evidence or lay or expert opinions on that point. Plaintiffs thus do not have a diminution of value claim, and this Court rejects such claim if Plaintiffs attempt to raise it now.

CONCLUSIONS OF LAW

I. THE PROPER SCOPE OF DAMAGES UNDER THE LOUISIANA REDHIBITION STATUTE IS THE NECESSARY COST OF REPAIRS.

148. Pursuant to Louisiana law, the proper measure of damages in a redhibition action is "the cost of repairs necessary to make the thing whole." *Doell v. Lachney*, 544 So. 2d 519, 523 (La. Ct. App. 1989); *see also St. Martin v. Mobil* Exploration *& Producing U.S., Inc.*, No. 95-5128, U.S. Dist. LEXIS 12808, at *28 (E.D. La. 1998) ("[a]s a general rule of thumb, when a person sustains property damage due to the fault of another, he is entitled to recover damages including the cost of restoration that has been or may be *reasonably* incurred) (emphasis added); *Freeport Sulphur Co. v. S/S Hermosa*,

526 F.2d 300, 304 (5th Cir. 1976) ("the amount of [property] damages must be determined by the cost of repairs to the property").

149. Plaintiffs are not entitled to a repair option that exceeds what is necessary to restore the property to its prior condition. The "necessary" measure of repairs is that which will "put [Plaintiffs] in as good a position as before [their] property was damaged, *but not a superior position*." *Louisiana Civil Jury Instructions*, §18.20 Property Damage – Restoration at 52 (2nd ed. 2001) (emphasis added); *see also St. Martin v. Mobil Exploration & Producing U.S., Inc.*, No. 95-4128, U.S. Dist. LEXIS 12808, at *31 (E.D. La. 1998) (refusing to award the full damages sought by plaintiff landowners because plaintiffs' request to convert the marsh at issue into solid ground extended "far beyond what the Court perceives to be reasonable, in scope as well as cost").

150. If the cost of restoring the property to its prior condition is "disproportionate to the value of the property or economically wasteful … damages are measured only by the difference between the value of the property before and after the harm." *Louisiana Civil Jury Instructions*, §18.20 Property Damage – Restoration at 52 (2nd ed. 2001) (citing *Hays v. State*, 856 So. 2d 64 (La. Ct. App. 2003).

II. PLAINTIFFS BEAR THE BURDEN OF PROOF UNDER THE LOUISIANA REDHIBITION STATUTE.

151. Although the elements for liability in redhibition differ from other causes of action for property damage, Plaintiffs bear the same burden in redhibition cases of proving the actual damages amount by a preponderance of the evidence. *Mitchell v. Popiwchak*, 677 So. 2d 1050, 1057 (La. App. Ct. 1996) ("plaintiff must prove the amount due by preponderance of the evidence" under La. C.C. art. 2545 [Redhibition Statute]), *and Louisiana Civil Jury Instruction Companion Handbook*, § 4:4 Redhibition Damages

Instructions, at 298 (2009-2010 Ed.) ("Like other parts of the plaintiff's case, damages must be established by a preponderance of the evidence"); *Louisiana Civil Jury Instructions*, §18.01 Damages–General Instruction, at 359 (2nd ed. 2001) (same).

152. Louisiana law further requires that Plaintiffs bear this burden on every aspect of damages, such that any claims for future damage are based on probability rather than speculation. *Louisiana Civil Jury Instruction Companion Handbook*, § 4:4 Redhibition Damages Instructions, at 298 (2009-2010 ed.) (Fact finder is "not entitled to award speculative damages which … the plaintiff might have suffered or might suffer in the future").

153. Plaintiffs may not use *present* damages as a means of shifting the burden to KPT to disprove *future* damages. *Pizani v. M/V Cotton Blossom*, 669 F.2d 1084, 1088 (5th Cir. 1982) ("We know of no rule shifting this burden to the defendant every time a plaintiff succeeds in introducing into evidence some figure denominated as 'cost of repairs'").

III. THE MOST COST-EFFECTIVE REPAIR OPTION IS THE APPROPRIATE MEASURE OF DAMAGES UNDER THE LOUISIANA REDHIBITION STATUTE.

154. If equally effective, alternative damage remedy options are presented, the more cost-effective option constitutes the proper measure of damages. *Doell v.* Lachney, 544 So. 2d 519, 523 (lowering the damage award in a redhibition action where the trial court "awarded the cost of an entire new roof when only one side of this four-sided roof leaked and needed replacement"); *Simoneaux v. Amoco Production Co.*, 860 So. 2d 560, 572-75 (La. Ct. App. 2003) (reversing the trial court judge's $12 million award for environmental damages to property and reinstating the jury's $375,000 award where the

"defense experts refuted the plaintiffs' experts' testimony on the necessity, method and cost of cleanup of the [property]").

155. The burden rests with Plaintiffs to prove by a preponderance of the evidence that their remedy proposal, in every aspect, is more cost-effective than KPT's solution. *Simoneaux v. Amoco Production Co.*, 860 So. 2d. 560, 572-75 (La. Ct. App. 2003); *see also In re Complaint of M&M Towing Co.*, No. 94-3264, U.S. Dist. LEXIS 2431, at *5 (E.D. La. 1997) (finding plaintiffs failed to prove that the costs of debris removal were attributable to the defendant, noting that "the extent of damages [to property] is measured by the cost of repairs [and] a party incurring property damage is entitled to no more than restoration"). In *Simoneaux*, the court found that the plaintiffs' damages theory for a $21 million award was "overkill" – and thus unjustified – given the defendant's more strategic option that fixed the problem for $375,000. *Id.*

156. In light of the above, this Court finds that Plaintiffs' repair protocol – gutting the Hernandez house to the studs – exceeds what is necessary to make the Hernandezes whole. Plaintiffs were unable to show with any reasonable certainty that the copper wires, plumbing and electronic appliances in the Hernandez house would fail in the future. At best, Plaintiffs could observe tarnishing now to speculate that such future failure would occur in the absence of Chinese drywall. None of Plaintiffs' experts could identify when such failure would occur, nor could Plaintiffs' experts point to any objective standard on which to base their speculations.

IV. SPECULATION OF FUTURE DAMAGES IS NOT COMPENSABLE AND DOES NOT JUSTIFY THE EXTREME REPAIR REMEDY PROPOSED BY PLAINTIFFS.

157. Plaintiffs' speculation about future failure of these systems does not satisfy their burden of proving damages by a preponderance of the evidence. Plaintiffs

are therefore not entitled to a remediation protocol that replaces these systems – especially when such replacement comes at a comparatively higher cost than KPT's repair option.

158. Based on the findings of fact set out in Paragraphs 6-58, 70-78, 90, the Court agrees with KPT's experts, Dr. Lee, Dr. Beyler and Dr. Perricone, that the functionality of electrical wiring, including the circuit breaker and low-voltage wiring, in the Hernandez house has not been impacted. Plaintiffs' experts, Mr. Rutila, Mr. Frantz and Dr. Galler concede that they cannot determine when wiring might fail. As such, the electrical wiring, including the circuit breaker and low-voltage wiring, does not need to be replaced as part of the repair protocol.

159. Based on the findings of fact set out in Paragraphs 6-29, 59-78, 86-91, the Court also agrees with KPT's experts that the functionality of copper plumbing in the Hernandez house has not been impacted. Plaintiffs have not demonstrated that plumbing has failed or that it is likely to fail once the source is removed. This includes the HVAC system which was recently replaced. As such, the copper plumbing and HVAC system does not need to be replaced as part of the repair protocol.

160. This Court additionally finds, based on the findings of fact set out in Paragraphs 6-29, 70-75, 79-85, that Plaintiffs have failed to meet their burden of proving that the electronic appliances and personal property in the Hernandez house require replacement. While Plaintiffs testified to tarnishing on certain appliances, at no point could they link any appliance failure to the drywall. Plaintiff's expert Dr. Galler conceded that he only engaged in a causal analysis of one appliance – a hairdryer – in the Hernandez house, and that there may have been another cause for its failure.

161. Accordingly, this Court concludes that KPT's repair option, which will leave the wires and plumbing intact in the Hernandez house, is the appropriate measure of damages. KPT's repair option will make Plaintiffs whole in a more reasonable and cost-effective manner.

V. NON-PECUNIARY DAMAGES, INCLUDING LOST WAGES, ARE NEITHER SOUGHT NOR JUSTIFIED BY THE EVIDENCE PRESENTED.

162. Plaintiffs have stipulated that they are not entitled to damages for mental anguish, loss of use and enjoyment, inconvenience or any other forms of non-pecuniary loss. (*See* Plaintiffs' Response to Motion for Partial Summary Judgment, 03/09/2010 at 1-2: "Mr. & Mrs. Hernandez are *not* claiming non-pecuniary damages in this lawsuit from KPT.").

163. Even without this admission, Plaintiffs would not be entitled to non-pecuniary damages because they have failed to properly show that such damages are compensable as required by Louisiana law. *See*, *e.g.*, *Landry v. Forest River, Inc.*, 953 So. 2d 1046, 1051-52 (La. Ct. App. 2007) (denying claim for non-pecuniary damages arising from a motor home with redhibitory defects because plaintiffs did not meet their burden where "the only evidence on the record that [plaintiffs] actually suffered any mental anguish or loss of use was their own testimonies") *and Young v. Ford Motor Co.*, 595 So. 2d 1123, 1133 (La. S. Ct. 1992) (noting that the "facts and circumstances surrounding the formation of the contract [do not] demonstrate that [plaintiff] purchased the new pickup truck … for a significant nonpecuniary purpose").

164. Lost wages are also not recoverable. As this Court has made clear, lost wages are a form of non-pecuniary or non-economic loss under the redhibition statute. *See*, *e.g.*, *Barrette v. Dow* Agrosciences*, L.L.C.*, U.S. Dist. LEXIS 20117, at *9-10 (E.D.

La. 2002) (granting defendant manufacturer's motion to dismiss plaintiff's redhibition claims for lost wages arising from defendant's allegedly defective product because "redhibition is only available for recovery of economic loss"); *see also Grenier v. Medical Engineering Corp.*, 243 F.2d 200, 206 n.5 (5th Cir. 2001) (noting that only "the right to sue in redhibition *for economic loss* still exists after the Louisiana Products Liability Act) (emphasis added); *Monk v. Scott Truck & Tractor*, 619 So. 2d 890, 893 (La. Ct. App. 1993) ("redhibition survives only for economic loss" in light of the LPLA).

VI. APPROPRIATE MEASURE OF DAMAGES.

165. Based on the stipulations and the Record developed in this matter during the trial from March 15 through March 19, the Court finds that the Plaintiffs may recover the following damages: (1) cost of repair in the amount of $58,564.93 and (2) compensation for rental while house is being repaired in the amount of $3,600-$5,400.

Dated: March 31, 2010

Respectfully submitted,

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CERTIFICATE

I hereby certify that the above and foregoing pleading has been served upon Russ Herman, Plaintiffs' Liaison Counsel, by email, and to all parties by electronically uploading the same to LexisNexis File & Serve in accordance with Pre-Trial Order No. 6, and that the foregoing was electronically filed with the Clerk of Court of the United States District Court for the Eastern District of Louisiana by using the CM/ECF system which will send a Notice of Electronic Filing in accord with the procedures established in MDL 2047, on this 31st day of March, 2010.

s/Douglas B. Sanders