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**I. BACKGROUND & PROCEDURAL HISTORY**

From 2004 through 2006, the housing boom and rebuilding efforts necessitated by various hurricanes led to a shortage of construction materials, including drywall. As a result, drywall manufactured in China was brought into the United States and used in the construction and refurbishing of homes in coastal areas of the country, notably the Gulf Coast and East Coast. Sometime after the installation of the Chinese drywall, homeowners began to complain of emissions

of smelly gasses, the corrosion and blackening of metal wiring, surfaces, and objects, and the breaking down of appliances and electrical devices in their homes. Many of these homeowners also began to complain of various physical afflictions believed to be caused by the Chinese drywall. Accordingly, these homeowners began to file suit in various state and federal courts against homebuilders, developers, installers, realtors, brokers, suppliers, importers, exporters, distributors, and manufacturers who were involved with the Chinese drywall. Because of the commonality of facts in the various cases, this litigation was designated as multidistrict litigation pursuant to 28 U.S.C. § 1407. In response to a Transfer Order from the United States Judicial Panel on Multidistrict Litigation on June 15, 2009, all federal cases involving Chinese drywall were transferred and consolidated for pretrial proceedings in the U.S. District Court, Eastern District of Louisiana.

The present matter commenced when Plaintiffs, on behalf of themselves and all other similarly situated owners and tenants, brought a class action against Defendants Taishan Gypsum Co., Ltd., f/k/a Shandong Taihe Dongxin Co., Ltd. (“Taishan”); Tobin Trading, Inc.; Venture Supply, Inc.; Harbor Walk Development, LLC; and The Porter-Blaine Corp. Plaintiffs filed their initial complaint in the Eastern District of Virginia on May 1, 2009. Thereafter, on May 26, 2009, Plaintiffs filed their First Amended Complaint. On August 3, 2009, Plaintiffs received notice that service of process of the First Amended Complaint was perfected on Defendant Taishan. Plaintiffs’ case was then transferred to the Eastern District of Louisiana on October 13, 2009. Subsequent to transfer, Plaintiffs moved to amend the First Amended Complaint to assert a national class against Taishan. Plaintiffs’ motion to amend was granted.

The Second Amended Class Action Complaint asserts claims against Taishan for negligence, negligence per se, breach of express and/or implied warranties, private nuisance, unjust enrichment, violation of the Consumer Protection Acts and for equitable injunctive and medical monitoring. Since Taishan did not timely respond to the Complaint or enter its appearance in this litigation, Plaintiffs moved for a default judgment. On November 20, 2009, the Court granted a preliminary default against Taishan.

On November 25, 2009, the Court issued a scheduling order setting an evidentiary hearing to address the scope and extent of appropriate remediation, and the cost of remediation. Pursuant to the Court's scheduling order, interested parties were permitted to intervene in the proceeding. The Court granted a motion to intervene filed by William and Deborah Morgan, Preston and Rachael McKellar, Frederick and Vanessa Michaux, J. Jerry and Inez Baldwin, Joseph and Kathy Leach, Robert and Lea Orlando, and Steven and Elizabeth Heischober. These parties are known as the Plaintiff-intervenors. Knauf Plasterboard Tianjin Co. Ltd. and The Mitchell Company, Inc. also moved for and were granted intervention.

Vigorous discovery was conducted by the Intervenors. Depositions were taken and expert reports were exchanged. A *Daubert* hearing was held on January 29, 2010. Subsequently, the Intervenors filed numerous motions *in limine*. On the eve of the evidentiary hearing, both Knauf and The Mitchell Co. voluntarily withdrew from the proceeding, leaving only the Plaintiff-intervenors to put on evidence.

This default matter came on for hearing without a jury on February 19, 2010, and culminated on February 22, 2010. The Court has carefully considered the testimony of all of the witnesses and the exhibits entered into evidence, as well as the record. Pursuant to Rule 52(a) of the Federal Rules

of Civil Procedure, the Court issues the following Findings of Fact and Conclusions of Law. To the extent that any finding of fact may be construed as a conclusion of law, the Court hereby adopts it as such and to the extent that any conclusion of law constitutes a finding of fact, the Court adopts it as such.

In this opinion, the Court will first discuss the general background of gypsum and drywall, then it will consider how and when the defective Chinese drywall was installed in the Plaintiff-intervenors' homes, next the scientific findings regarding Chinese drywall, the nature and level of the corrosive environment in the Plaintiff-intervenors' homes, the type and degree of resulting damages, the proper scope of remediation, and the costs of this remediation.

## **II. FINDINGS OF FACT & CONCLUSIONS OF LAW**

### **A. BACKGROUND: GYPSUM & DRYWALL**

Drywall is a widely used construction material that is also known as gypsum board, wallboard, plasterboard, sheetrock, and gyproc. P2.0006-0003 (*Cozen O'Connor, Chinese Drywall Litigation: Subrogation Whitepaper* (2009)). A drywall panel is composed of a layer of hardened gypsum plaster sandwiched between two layers of paper liner. *Id.* Gypsum is a hydrated calcium sulfate, composed of two molecules of water (H<sub>2</sub>O) and one of calcium sulfate (CaSO<sub>4</sub>). *Id.*

The gypsum used to make drywall can be created both naturally and synthetically. *Id.* Naturally occurring gypsum is a deposit largely the result of the evaporation of water in ancient inland seas which contains large amounts of dissolved gypsum. P2.0051-001 (*Treatment and Disposal of Gypsum Board Waste*, Construction Dimension, February 1992 at 5). Synthetic gypsum is chemically identical to mineral gypsum, but the amount and types of trace materials and unreacted sorbents found in the source material can vary among power plants and among mines from which

it originates. P2.0006-0003 (Cozen O'Connor, *Chinese Drywall Litigation: Subrogation Whitepaper* (2009)). Synthetic gypsum is generally obtained in the final stage of industrial processes, where sulfuric acid is neutralized by a calcium salt; for example it is produced as a byproduct of coal combustion power plants. *Id.*; P2.0240.0014 (ASTM International report).

To make drywall from gypsum, first gypsum is crushed or ground up and heated to about 350 degrees Fahrenheit to remove approximately seventy-five percent (75%) of its water content in a process called calcining, thereafter becoming a fine white powder. P2.0006-0003 (Cozen O'Connor, *Chinese Drywall Litigation: Subrogation Whitepaper* (2009)); P2.0051-0001 (*Treatment and Disposal of Gypsum Board Waste*, Construction Dimensions, February 1992 at 5). Second, the calcined gypsum is mixed with water, foam, and other additives to form a slurry which is fed between continuous sheets of paper on a continuous belt line. *Id.* Third, as the board moves down the belt line, the calcined gypsum recrystallizes or rehydrates, reverting to its original gypsum state, and the paper sheets become firmly bonded to the rehydrated core. *Id.* Finally, the board is cut to length and conveyed through dryers to remove free moisture. *Id.*

Historically, gypsum was used as far back as 3700 B.C. by the Egyptians as a base to preserve the wall murals in the pyramids. P2.0051-0001(*Treatment and Disposal of Gypsum Board Waste*, Construction Dimension, February 1992 at 6); P2.0240-0022 to -0023 (ASTM International, Oct. 2009 at 9-10). The Roman Empire used gypsum for interior purposes, such as the interior walls of Pompeii. *Id.* There is little information of the use of gypsum plaster during the Middle Ages. *Id.* The modern science of gypsum began with the discoveries by Antoine Lavoisier outlined in his two papers on gypsum presented to the French Academy of Sciences in 1765 and 1766. P2.0240-0022 to -0023 (ASTM International, Oct. 2009 at 11). In the United States, the use of gypsum board

started in the early 1950s and was driven by the following issues, (1) avoiding the drying time of plaster which allowed earlier occupancy of buildings, and (2) the lack of skilled plasterers in many locations. P2.0240-0026(ASTM International, Oct. 2009, pg. 13). Gypsum is fire resistant, thus making it a preferable material for drywall. P2.0051-0001 (*Treatment and Disposal of Gypsum Board Waste*, Construction Dimensions, February 1992 at 6).

**B. HOW & WHEN THE CHINESE DRYWALL WAS INSTALLED IN THE PLAINTIFF INTERVENOR HOMES**

The Chinese drywall in the present cases was manufactured by Shandong Taihe Dongxin Co., Ltd. which on September 10, 2007, changed its name to Taishan Gypsum Co., Ltd. P3.0629-1000 (Affidavit of Russ M. Herman In Support of the Plaintiffs' Steering Committee's Evidentiary Presentation Regarding Taishan Gypsum Co., Ltd. ¶15); Trial Transcript at 2/19 Vol.I p.9-18, P3.0629-0150; P3.0629-0177 (Herman Opening). Hereafter, Shandong Taihe Dongxin Co., Ltd. and Taishan Gypsum Co., Ltd. shall be referred to as “Taishan.”

On November 9, 2005, Venture Supply, Inc., a company in Norfolk, Virginia, provided an original letter of credit in the amount of \$429,600.00 to the order of Shandong Taihe Dongxin Co. for 120,000 sheets of drywall to meet all USA ASTM ratings and fire rating standards. P3.0629-1000 (Affidavit of Russ M. Herman ¶5), P1.1802-0063 to 0068. On November 14, 2005, Frank Clem, manager of Venture Supply, was advised that the manufacturer was not clear on U.S. ASTM ratings and Venture Supply was requested to remove U.S. ASTM requirements from the letter of credit and rely solely upon Chinese ratings. P3.0629-1000 (Affidavit of Russ M. Herman ¶7). Venture Supply then contracted with Taishan to purchase drywall. P3.0629-1000 (Affidavit of Russ M. Herman ¶¶7-8), P1.1802-0070. Although it originally contracted to meet United States' ASTM standards, Taishan insisted that the drywall it sold to Venture Supply,

Inc. would not be required to meet these standards. *Id.* Accordingly, on November 15, 2005, Venture Supply directed its bank to remove the U.S. ASTM requirement from the letter of credit to Taishan. *Id.* Pursuant to contract, on December 25, 2005, Taishan had 2,000 pallets of drywall shipped aboard the M/V Glykofillousa from the Chinese Port of Loading, Lianyungang. P3.0629-1000 (Affidavit of Russ M. Herman ¶¶10-11), P1.1802-0091, P1.1802-0003. The shipment arrived in the United States in February, 2006. *Id.*

On December 16, 2005, a second contract was signed between Venture Supply and Shandong Taihe Dongxin Co. for 100,000 sheets on 2,000 pallets to be shipped to Norfolk, Virginia. P3.0629-1000 (Affidavit of Russ M. Herman ¶12), P1.1802-0089, P1.1802-0003, P1.1802-0007. However, the second shipment of drywall was reduced to 53,912 sheets on 586 pallets, which was shipped onboard the M/V Atlantic Fortune from the Chinese Port of Loading, Lianyungang. *Id.* This shipment was off-loaded in Camden, New Jersey. *Id.*

All of Taishan's drywall sold to Venture Supply bore the following legend on end binding label tape: "4'x12'x1/2" Gypsum Board Distributed by Venture Supply, Inc." and on the back of the board: "Venture Supply, Inc. MFG. Shandong Taihe Dongxin, Co., Ltd., China." P3.0629-1000 (Affidavit of Russ M. Herman ¶6), Deposition of Samuel G. Porter (12/16/09, 12/17/09) at 321-322.

The Porter-Blaine Corporation, a company related to Venture Supply, Inc., purchased Taishan drywall from Venture Supply, Inc. *See* 2/19/10 Trial Transcript at p.17 (12-14). Venture Supply, Inc. shipped Taishan drywall to each of the seven intervening plaintiffs' (hereinafter "Plaintiff" or "Plaintiff-intervenor") homes and the drywall was thereupon installed by the Porter-Blaine Corporation in the homes. *See* Trial Transcript at 2/19 Vol.I p.17(9-14),

p.13(16-20), p.16(22) - 17(2), p.20(17-24) (Herman Opening).

The drywall product from China was never tested pursuant to the United States ASTM standard. P3.0629-1000 (Affidavit of Russ M. Herman ¶13), P1.1802-0046 to 0061, P1.1802-0023; Deposition of Samuel G. Porter (12/16/09) at p. 84-85. Venture relied on a representation that Chinese testing was equivalent to the U.S. testing standards. *Id.* However, the Chinese tests were accomplished by a government agency of the Republic of China and not by an independent testing laboratory. *Id.* Certificates of Quality were likewise issued by a government agency. P3.0629-1000 (Affidavit of Russ M. Herman ¶14), P1.1802-0045, P1.1802-0043. But the Certificate of Quality Management System Certification issued predates the production of the drywall shipped to the United States by at least two (2) years. *Id.*

On March 19, 2005, BNBM became the largest shareholder of Taihe Dongxin by purchasing sixty-five percent (65%) of the equity of Taishan Dongxin. P3.0629-1000 (Affidavit of Russ M. Herman ¶16), P3.0629-0150, P3.0629-0177. The state-owned Assets Supervision and Administration Commission of the State Counsel (SASAC) of the People's Republic of China controls the "plasterboard" manufacturing, exportation and certification industry. P3.0629-1000 (Affidavit of Russ M. Herman ¶¶18 -20), P3.0629-0113, P3.0629-0136, 0137. The SASAC supervises and manages the State-owned assets of the enterprises engaged in drywall production, including Taishan. *Id.* The degree of control SASAC (Government of China) exerts and influences is extensive. *Id.* For example, SASAC assumes the responsibility as the investor on behalf of the state; it supervises and manages the state-owned assets and enterprises; controls the value preservation and increment of the state-owned assets; guides and pushes forward the reform and restructuring of SOEs; appoints and removes top executives of

SOEs; is responsible for organizing SOEs to turn gains over to the state; is responsible for urging SOEs to carry out laws and regulations for safety production; directs and supervises the management work of local state-owned assets; and undertakes other tasks assigned by the State Council. *Id.* Furthermore, SASAC oversees and controls 150 large central state-owned enterprises (SOEs), including China National Building Material Group Corporation (AS CNBM Group). P3.0629-1000 (Affidavit of Russ M. Herman ¶18), P3.0629-0113 to 0116. SASAC has a presence in the United States through CNBM USA Corporation, located at 17800 Castleton Street, City of Industry, California 91748. P3.0629-1000 (Affidavit of Russ M. Herman ¶21), P3.0629-0122. SASAC owns 100% of the CNBM Group. *Id.* CNBM Group, in turn, owns 56.4% of the China National Building Material Company, Limited (CNBM Co., Ltd); 75% of BNBM; 100% of CNBM Import and Export Co. and 100% of CNBM Academy. P3.0629-1000 (Affidavit of Russ M. Herman ¶19), P3.0629-0117 to 0120, P3.0629-0123 to 0125. CNBM Co., Ltd. Owns 52.40% of Beijing New Building Material Co., Ltd. (BNBM). *Id.* CNBM Group, in turn, owns 56.4% of the China National Building Material. *Id.* CNBM USA was established in 2006 the same year that Taihe (Taishan) sold Chinese-manufactured drywall to Venture Supply Inc. *Id.* CNBM (USA) Corporation has the announced mission to provide all kinds of building materials and services in the national market. *Id.*

CNBM's Gypsum Board business production on December 31, 2008 from its wholly owned subsidiary, Taishan Gypsum Co., was \$262.3 million yuan. P3.0629-1000 (Affidavit of Russ M. Herman ¶22), P3.0629-0125, P3.0629-0331, 0332. Taihe's (Taishan) revenue for 2006 was 773,000,000 yuan. P3.0629-1000 (Affidavit of Russ M. Herman ¶23), P3.0629-0130. A yuan is worth approximately 6.8 dollars. *Id.* Taishan manufactures more than 60 types of

products including standard plasterboard. P3.0629-1000 (Affidavit of Russ M. Herman ¶24), P3.0629-0153. In addition to the shipments in 2006 to Venture Supply, Taishan Plasterboard Co., Ltd. shipped 76 shipments of plasterboard to the U.S. between March 2006 and August 2007 to four U.S. ports. P3.0629-1000 (Affidavit of Russ M. Herman ¶25), P3.0629-0175.

**C. GENERAL SCIENTIFIC FINDINGS ON CHINESE DRYWALL WHICH DISTINGUISH IT FROM TYPICAL, BENIGN DRYWALL**

Chinese drywall is different from typical, benign drywall for the following reasons:

1. Chinese drywall has a significantly higher average concentration of strontium and significantly more detectable levels of elemental sulfur. P2.0135-0003.
2. Chinese drywall releases reduced sulfur gases. P1.2025-0003, 0004, (Streit Supplemental Report), Trial Transcript at 2/19 Vol.II p.57 (23)– p.58(18) (Scully Testimony) (The Court has accepted Dr Scully as an expert in the fields of corrosion, metallurgy, and materials science. Trial Transcript at 2/19 Vol. I, p.46 (19-24) (Scully Testimony)). The three main gases that are released from CDW are hydrogen sulfide (H<sub>2</sub>S), carbonyl sulfide (COS), and carbon disulfide (CS<sub>2</sub>). Trial Transcript at 2/19 Vol.II p.57 (23)–58(18) (Scully Testimony), Trial Deposition of Lori Streit (2/16/10) at p.68(21)– p.69(3). The CDW also releases elemental sulfur. P1.2025-0003, 0004 (Streit Supplemental Report). The Plaintiffs' experts have detected reduced sulfur gas emissions by conducting laboratory tests on samples of Chinese drywall. Trial Deposition of Lori Streit (2/16/10) at p.24(16)– p.25(1). These emissions are also confirmed by strong odors. Trial Deposition of Lori Streit (2/16/10) at p.55(10–14), Trial Transcript at 2/22 Vol.I p.101(7–14) (Rutila Testimony). The fact that Chinese drywall emits

sulfur gases has also been reported by the U.S. Consumer Products Safety Commission, the Florida Department of Health, and other investigatory agencies and firms. Trial Deposition of Lori Streit (2/16/10) at p.68(21)– p.69(3), p.80(1–17).

3. The sulfur gases released by Chinese drywall are irritating to the human body. Trial Deposition of Lori Streit (2/16/10) at p.55(15–21), Trial Transcript at 2/22 Vol.I p.101(17–19) (Rutila Testimony). Exposed individuals reported irritation of the eyes, respiratory system, and skin, among other things. *Id.*
4. The sulfur gases released by Chinese drywall cause offending odors in homes, making them hard if not impossible to live in. Trial Transcript at 2/19 Vol.I p.53(23)-pg.54(7)(Morgan testimony), Trial Transcript at 2/22 Vol.I p.8(4-17)(Michaux Testimony), Trial Deposition of Lori Streit (2/16/10) at p.55(10-1
5. The sulfur gases released by Chinese drywall are corrosive to metals, particularly copper and silver. Trial Deposition of Lori Streit (2/16/10) at p.80(8–17), p.90(23)– p.91(7), Trial Transcript at 2/19 Vol.II p. p.56 (19)– p.57(12), p.59(3–12) (Scully Testimony)). “Corrosion” is defined by the ASTM as the chemical or electrochemical reaction between a material, usually a metal, and its environment that produces a deterioration of the materials and its properties. P1.1852-0002 (ASTM Terminology), Trial Transcript at 2/19 Vol. II p.51(20)-p.52(5) (Scully Testimony). Copper and silver metal components in the Plaintiffs’ houses are extremely vulnerable to corrosion from exposure to the sulfur gases. P2.0076-0001, 0002 (Graedel 1983 (copper)), Trial Transcript at 2/19 Vol.II

p.56(19–24) (Scully Testimony), P2.0202-0001, 0002 (Chudnovsky 2008 (silver)), Trial Transcript at 2/19 Vol.II p.157(13–18) (Galler Testimony). The sulfur gases, in reacting with metals, form sulfide deposits on the surfaces of the metals. Trial Deposition of Lori Streit (2/16/10) at p.80(8–17). For example, a reaction of sulfur gases with copper pipes will form copper sulfide on the metals. Trial Deposition of Lori Streit (2/16/10) at p.72(18–24). The reaction of sulfur gases with metals can be said to be “consuming” the useful, pure metals by replacing those metals with sulfides. Trial Transcript at 2/19 Vol.II p.141 (15–16) (Galler Testimony) (The Court has accepted Mr. Galler as an expert in the fields of electrical engineering, power electronics, electrical machinery, and failure analysis. Trial Transcript at 2/19 Vol.I, p.128 (3-7) (Galler Testimony)).

6. The corrosion on metals caused by the sulfur gases emitted by Chinese drywall causes premature failure of electrical & mechanical devices. P1.2001-0019, 0020, 0021 (CTL/Krantz Original Report, HVAC Coil Failure due to Corrosion), P3.0625-0001, 0002 (FRE 1006 Summary of HVAC Coil Failure Data), P1.2053-0001 (Virginia Corrosion Thicknesses Exceed Failure Standard), Trial Transcript at 2/19 Vol.II p.55(24) – p.156(17) (Galler Testimony), Trial Transcript at 2/19 Vol.II p.100(17) – p.101(16), p.152(22) – p.153(1) (Scully Testimony), Trial Transcript at 2/22 Vol.I p.90(3-23) (Barnett Testimony proffer) (The PSC tenders Dr. Barnett, and the Court accepts him as, an expert in Engineering and Fire Safety. Trial Deposition of Jonathan Barnett (2/12/10) at p. 11(14)-18(22), P1.2015-0019 – P1.2015-0024 (Barnett Report, C.V.). The Plaintiff-intervenors

have reported many premature failures of major appliances and consumer electronics in their homes during their first three years of use of these homes. P1.2018-0014, 0015, 0046 (SGH/Rutila Supplemental Report), Trial Transcript at 2/22 Vol.II p.11(23) – p.12(13)(Rutila Testimony). Laboratory analysis of these copper and silver components from the Virginia homes identified the corrosion as the cause of an HVAC coil failure and severe corrosion deposits at the operative connections in the appliances and in consumer electronics. P1.2018-0015, 0046 (SGH/Rutila Supplemental Report), P1.2001-0019, 0020, 0021 (CTL/Krantz Original Report), P1.2020-0002, 0003, 0004, (Original Galler Report), Trial Transcript at 2/19 Vol.II p.48(23) – p.149(6)(Galler Testimony), Trial Transcript at 2/19 Vol.II p.52(18) – p.53(4), p.65(6-16), p.111(18-23) (Scully Testimony). Mechanical, electrical, and electronic failures have been shown to have occurred prematurely due to the severe industrial corrosive environments in these Chinese Drywall homes. P1.2001-0019, 0020, 0021 (CTL/Krantz Original Report, HVAC Coil Failure due to Corrosion), P3.0625-0001, 0002 (FRE 1006 Summary of HVAC Coil Failure Data), P1.2053-0001 (Virginia Corrosion Thicknesses Exceed Failure Standard), Trial Transcript at 2/19 Vol.II p.55(24) – p.156(17) (Galler Testimony), Trial Transcript at 2/19 Vol.II p.100(17) – p.101(16), p.152(22) – p.153(1) (Scully Testimony), Trial Transcript at 2/22 Vol.I p.90(3-23) (Barnett Testimony proffer) (The PSC tenders Dr. Barnett, and the Court accepts him as, an expert in Engineering and Fire Safety. Trial Deposition of Jonathan Barnett (2/12/10) at p. 11(14)-18(22), P1.2015-0019 – P1.2015-0024 (Barnett Report,

C.V.). Evaluation of comparable HVAC systems, appliances, and electronics in *control* homes (e.g., similar homes without Chinese Drywall) do not show premature failures of HVAC systems, appliances, and electronics, and the wires do not have corrosion product thicknesses that would predict premature failures. P1.2022-0005, 0006, 0007, 0008 (Scully Supplemental Report), Trial Transcript at 2/19 Vol.II p.1(23) – p.112(2) (Scully Testimony), Trial Transcript at 2/22 Vol.II p.12(18) – p.13(22), p.23(6-14) (Rutila Testimony), P1.1892-0001, 0002, 0003, P1.2057-0001, 0002, P1.2057-0001, 0002 (comparisons between corroded electronics from CDW homes and electronics from control homes), Trial Transcript at 2/19 Vol. II p.144(2-19), p. 149(7-16) (Galler Testimony).

7. The corrosion on metals caused by the sulfur gases emitted by Chinese drywall poses a fire risk. Trial Transcript at 2/19 Vol. II p.130 (3–14) (Galler Testimony). The corrosion increases resistance in the circuitry of appliances and electronics. See P1.2020-0004 (Galler Report); see also P2.0202-0001 (Chudnovsky, Corrosion of Electrical Conductors), Trial Transcript at 2/19 Vol. II p. 130 (3-14) (Galler Testimony). Increased resistance increases heat in appliances and electronics. P1.2020-0002 (Galler Report), Trial Transcript at 2/19 Vol. II p. 130 (3-14) (Galler Testimony). This increased resistance can cause excessive heating of the connection when energized. See Trial Transcript at 2/19 Vol. II p. 129 (25)– p.130 (2) (Galler Testimony); see also P2.0202-0001 (Chudnovsky 2008). Complete failure of a switch can lead to fires or other life safety problems, depending on the intended function of the switch. Trial Transcript at 2/19 Vol. II

p.130 (3–14) (Galler Testimony).

Knauf Plasterboard Tianjin (hereinafter “Knauf” or “KPT”) and Plaintiffs Steering Committee (hereinafter “PSC”) experts agree that all of the problematic Chinese drywall products share similar chemical and physical properties. P1.2025-0003, 0004, (Streit Supplemental Report), Deposition of Matthew Perricone Ph.D. (1/21/10) Ex. 2 (Perricone Original Report) at p. i (¶ 4.7), Deposition of Sandy Sharp (2/5/10) at p.148(15)– p.150(11), Trial Deposition of Lori Streit (2/16/10) at p.24(6)– p.25(1), p.26(11–12), p.27(21)– p.28(7) (finding commonalities among Chinese drywall products).

**D. PLAINTIFF-INTERVENOR HOMES HAVE BEEN EXPOSED TO A CORROSIVE ENVIRONMENT PRODUCED BY CHINESE DRYWALL**

The level of corrosive sulfur gases emitted by Chinese drywall in the Plaintiff-intervenors’ homes exceed the safe level established by recognized standards, peer reviewed literature, and expert opinions and this corrosive environment has had a significant impact on the expose property.

**1. CPSC Standards**

The seven Plaintiff intervenors’ homes meet the CPSC “Interim Guidance – Identification of Homes with Corrosion from Problem Drywall (January 28, 2010).” P1.1844-0001 (CPSC Guidance Problem Drywall), Trial Transcript at 2/22 Vol.II p.6(25) – p.7(5) (Rutila Testimony). P1.1844-0001 (CPSC Guidance Problem Drywall), Trial Transcript at 2/22 Vol. II p.11(1-19) (Rutila Testimony). The CPSC Guidance sets forth “Corroborating Evidence” for the presence of CDW in such homes. *Id.* The CPSC Guidance requires that 4 out of 6 types of corroborating evidence be met to establish a “Problem Drywall” home. *Id.* The six types of evidence are: (a)

corrosive conditions demonstrated by copper sulfide on copper coupons or confirmation of sulfur in blackening of grounding wires and/or air conditioning coils; (b) confirmed markings of Chinese origin on the drywall; (c) strontium levels (excluding the exterior paper) exceeding 1200 ppm; (d) laboratory elevated sulfur readings above 10 ppm; (e) elevated levels of H<sub>2</sub>S, COS, CS<sub>2</sub>; and (f) corrosion of copper to form copper sulfide when copper is placed in test chambers with drywall samples from the home. *Id.* The seven Plaintiff intervenors' homes meet the corroborating evidence criteria set forth in the CPSC Guidance. P1.2025-0003, 0004. (Streit Supplemental Report, off gassing studies), Deposition of Lori Streit (2/16/10) at 2/22 Vol. I p.39(24) – p.40(4), p.42 (8-14), p.51(13-25), p.59 (14) – p.60 (6) (Streit Testimony), P1.1824 (FRE 1006 Summary of Screening Data for Virginia Homes, (copper strips in mason jars and laboratory verification of copper sulfide on HVAC and wire), P1.2001-0019, 0026, 0036, P1.2002-0007 (CTL/Krantz Original and Supplemental Reports, laboratory confirmation copper sulfide on wires and HVAC), P1.2021-0008, 0010, 0011, P1.2022-0020, 0021, 0022 (Scully Original and Supplemental Reports, laboratory confirmation of copper sulfide on wires and HVAC), Trial Transcript at 2/19 Vol.II p.111(13-22) (Scully Testimony, copper sulfide on wires and HVAC) (The PSC tenders Brad Krantz, and the Court accepts him, as an expert in corrosion science. P1.2001-0001 (Original CTL/Krantz Report, C.V.)), Trial Transcript at 2/22 Vol. II p.5(13-17) (Rutila Testimony).

## **2. Florida Division of Health Standards**

The Florida Case Definition for “Confirmatory Evidence of Drywall Associated Corrosion” includes three items. P1.1841-0001-0004 (FLA Case Definition), Trial Transcript at 2/22 Vol.II p.5(7) – p.8(25) (Rutila Testimony). If any one of the three is positive, that is

considered confirmatory evidence. *Id.* The three types of confirmatory evidence are: (1) laboratory testing for elemental sulfur indicating that the gypsum source in the drywall contributes to the reduced sulfur gases emitted from the corrosive drywall; (2) laboratory analysis (i.e., headspace) for reduced sulfur gas emissions capable of causing copper corrosion in the house; and (3) qualitative analysis of suspect drywall for its ability to cause corrosion/blackening of copper under controlled conditions indicating drywall samples from the house emit gasses capable of corroding copper. *Id.* The Taishan drywall in the seven Virginia Plaintiff intervenors' homes meets at least one of the types of the confirmatory evidence criteria for the Florida Case Definition. P1. 2025-0003, 0004 (Streit Supplemental Report laboratory results for elevated sulfur, H<sub>2</sub>S, COS, and CS<sub>2</sub>), Deposition of Lori Streit (2/16/10) at 2/22 Vol.I p.39(24) – p.40 (5) (Streit Testimony); *see also* P1.2023-0011 (Streit Original Report), P1.1824-0001 (FRE 1006 Summary of Screening Data for Virginia Homes, “aging” tests showing blackening of copper strips in mason jars (chamber test)).

### **3. Battelle & International Standards Association Classifications Indicate the Corrosion Found in Plaintiff-intervenor Homes is Severe**

The Plaintiff intervenors' homes demonstrate levels of corrosion found in the most severe industrial corrosive environment. Trial Transcript at 2/19 Vol. II p.112(9-15) (Scully Testimony). P2.0195-0026, 0065, 0066 (Abbott, 1993, MTI #38), Trial Transcript at 2/19 Vol.II p.92 (11-18), p.83 (8-14) (Scully Testimony); *see also* P2.0228-0012 (p. 360) (Sinclair text), P2.0245-0003 (Abbott 1988). According to the Battelle Classification scheme, the recognized standard for measuring corrosivity of environments, there are four Classifications ranging from benign to severe industrial. *Id.* The Classifications are characterized as I (benign), II (mild), III (moderately severe), and IV (severe industrial). *Id.* The International Standards Association

(ISA) has developed a parallel corrosivity classification scheme. P1.0176-0003, 0014, Trial Transcript at 2/19 Vol.II p.91(12-15) (Scully Testimony). Additionally, the corrosivity classification schemes established by standard-setting organizations such as International Standards Organization (ISO) mirror the Battelle and the ISA standards. P1.1836-0001, (ISO 11844 Corrosivity Standard), P1.0091 (IEC 654-4 Corrosivity Standard), Trial Transcript at 2/19 Vol. II p.112 (6-15) (Scully Testimony).

The Battelle Classification Scheme for Corrosive Environments establishes qualitative and quantitative criteria to be used to classify environments. P2.0195-0017, 0026, 0065, 0066 (Abbott 1993, MTI #38), P2.0228-0012 (Sinclair text), Trial Transcript at 2/19 Vol.II p.91(6-15) (Scully Testimony). These criteria are discussed in turn.

*a. Qualitative Criteria for Corrosivity*

The qualitative criteria for Battelle Corrosivity Classifications schemes are as follows:

- a. No significant corrosion observed, well-controlled environment;
- b. Pore corrosion mechanism begins, operating reliability affected, unprotected copper contains oxide and chloride;
- c. Moderately severe environment, associated with industrial operation, pore corrosion and creep, corrosion product on unprotected copper rich in sulfide and oxide; and
- d. Severe industrial environment, corrosion mechanism dominated by creep, corrosion product on copper primarily a sulfide. P2.0195-0026, 0065, 0066 (Abbott 1993, MTI #38), P2.0228-0012 (Sinclair text), Trial Transcript at 2/19 Vol.II p.91(5)-94(4) (Scully Testimony).

The wires and HVAC coils that were removed from the Plaintiff-intervenor homes were shown in the laboratory to have a corrosion product that is primarily copper sulfide and/or rich in sulfide. P2.0195-0066 (Abbott 1993, MTI #38), P2.0228-0012 (Sinclair text), P1.2001-0019, 0026, 0036, 0040, 0042, 0043, 0044, 0045, 0046, P1.2002-0007 (CTL/Krantz Original and Supplemental Reports), P1.2021-0008, 0010, 0011, 0012, 0013, 0017, 0018, 0027, 0029, 0031, 0033, 0035, P1.2022-0020, 0021, 0022, 0023, 0024, 0025, 0030, 0031, (Scully Original and Supplemental Reports), Trial Transcript at 2/19 Vol.II p.111(18-22) (Scully Testimony). The wires and HVAC coils that were removed from the Plaintiff intervenors' homes demonstrated both pore corrosion and creep corrosion. P1.2022-0006, 0007, 0008 (Scully Supplemental Report), Trial Transcript at 2/19 Vol.II p.51 (3-19) (Scully Testimony). Based solely on these qualitative Battelle corrosivity criteria, the homes of the Plaintiff intervenors are classified as severe industrial corrosive environments. Trial Transcript at 2/19 Vol.II p.83(8-14), p.112(3-8) (Scully Testimony). Sandia National Laboratories (SNL) also established that wires taken from Chinese Drywall (CDW) in Virginia, Florida, and Louisiana homes in the SNL study demonstrated a corrosion product rich in copper sulfide, pore corrosion and creep corrosion, and classified the CDW environments from which the wires were taken to be severely corrosive. P1.0060-0050, 0057, 0063 (CPSC/Sandia Report), Trial Transcript at 2/19 Vol.II p.80(2) – p.81(17), p. 82(24) – p.83(14), p.94 (7-20) (Scully Testimony).

*b. Quantitative Criteria for Corrosivity*

The Battelle Corrosivity Classifications, as well as ISA and the other corrosivity standards, also have quantitative criteria for the levels of corrosive environments. The qualitative criteria are based on corrosion product thickness measurements, measured in

angstroms, units used to measure electromagnetic radiation equal to one ten-billionth of a meter, or microns, linear measurements equivalent to one-millionth of a meter. The Battelle qualitative thickness criteria are as follows:

- a. < 300 angstroms for 30 days (< .03 microns)
- b. 300-1000 angstroms for first year (.03 - .1 microns)
- c. 1000-4000 angstroms for first year (.1 - .4 microns)
- d. > 4000 angstroms for first year (> .4 microns)

P2. 0195-0026, 0065, 0066 (Abbott, 1993 MTI #38), P2.0228-0012 (Sinclair text), Trial Transcript at 2/19 Vol.II p.92(11) – p.93(14) (Scully Testimony).

The wires that were removed from the Plaintiff intervenors' homes demonstrated corrosion product thicknesses far above the severe industrial corrosivity environment 4000 angstroms threshold, adjusted to a 3 year thickness (Virginia Plaintiff intervenor homeowners resided in the homes approximately 3 years). P1.2053-0001 (Examples of Virginia Components Exceeding Three Year Battelle Standard), Trial Transcript at 2/19 Vol.II p.82(24) – p.83(14) (Scully Testimony). The measured corrosion thicknesses on the wires from the Virginia homes meet the Battelle Classification IV quantitative criteria for a severely industrial corrosive environment based on either a "linear growth law" or a "Parabolic growth law." P1.2053-0001 (Examples of Virginia Components Exceeding Three Year Battelle Standard), Trial Transcript at 2/19 Vol.II p.97(5) – p.98(10), p.99 (11-15) (Scully Testimony). Corrosion product thickness measurements on wires from the Virginia homes that meet the quantitative criteria for Battelle Corrosive Classification IV (severe industrial) were also documented by measurements on wires from CDW homes by the Sandia National Laboratory and by three other laboratories performing

expert work in this case. P1.0060-0013, 0050, 0055, 0057, 0063 (CPSC/Sandia Report), P1.2002-0007 (CTL/Krantz Laboratory), P1.2022-0009, 0010 (Scully, U Va. Laboratory), P1.2018-0010, 0011, 0012 (SGH/Rutila laboratory), Trial Transcript at 2/19 Vol.II p.110 (14) – p.111(10) (Scully Testimony). Thus, the bottom line is that the Plaintiff intervenors’ homes demonstrate a Battelle classification for corrosivity which is a “severe industrial” environment, whether one applies the qualitative or the quantitative Battelle corrosivity criteria to corroded wires and corroded HVAC samples taken from these homes. Trial Transcript at 2/19 Vol.II p.112(3-15)(Scully Testimony).

#### **4. Peer-reviewed Literature & Expert Opinion Consensus**

The application of Battelle, ISA, and other corrosive environment criteria to real world components is demonstrated in the peer-reviewed literature. P1.2051-0001, 0002 (Literature re Corrosion Real World Components), P2.0223-0003 (Abbott 1991), P2.0222-0006 (Abbott Review Flowing Mixed Gases), P2.0229-0003, 0004, 0005, 0008 (Comizolli, 1992), Trial Transcript at 2/19 Vol.II p.92 (18-25), p.159(23) – p.160(2) (Scully Testimony). The application of Battelle, ISA, and other corrosive environment criteria to real world components is demonstrated in industry standards for corrosivity such as the International Society of Corrosion Engineers (NACE) Standard Recommended Practice Preparation, Installation, Analysis, and Interpretation of Corrosion Coupons in Oilfield Operations. P1.1853-0004 (NACE Standard). The application of Battelle, ISA, and other corrosive environment criteria to real world components is also demonstrated by the Chinese Drywall Investigation performed by Sandia National Laboratories as documented in the CPSC/Sandia “Interim Report on the Status of Electrical Components Installed in Homes with Chinese Drywall.” P1.060-0050, 0057

(CPSC/Sandia Report), Trial Transcript at 2/19 Vol.II p.82(24) – p.83(12), p.99(7-15)(Scully Testimony). The application of Battelle, ISA, and other corrosive environment criteria to real world components is supported by the expert opinion of Dr. John Scully, a leader in the field of corrosion science in the academic, military, and publishing arenas, as well as by other leaders in the field. P1.2022-0009, 0009, 0010 (Original and Supplemental Reports of John Scully), P1.2052-0001, 0002 (List of Individuals Contacted by John Scully regarding Measurements on Real Components and use of Standards), Trial Transcript at 2/19 Vol.II p.39(15-25), p.40(1-8), p.41(5) – p.42(14), p.112 (3-8) (Scully Testimony).

Based on the Battelle corrosivity criteria, corrosion scientists have established a “failure threshold” to predict electrical and electronic failures based on measuring corrosion product thicknesses on real world components or copper reactivity coupons standardized to a given period of time that the copper is exposed to the corrosive environment. The standard failure threshold is 1000 angstroms (.1 micron) for the first year of exposure, or 300 angstroms (.3 micron) for 30 days of exposure. P2.0195-0017, 0026, 0028, 0065, 0066 (Abbott 1993 MTI #38), P1. 0176-0014 (ISA Standard 71.04), Trial Transcript at 2/19 Vol.II p.92 (11-23), p.94 (24) – p.95(5), p.103(5-10), p.111 (3-10) (Scully Testimony). The components at issue in this case that were taken from Virginia homes and analyzed in the laboratory do exceed the recognized 1000 angstroms (.1 micron) failure threshold standard for the first year of exposure by many multiples and even by orders of magnitude in some cases. P1.2053-0001 (Examples of Virginia Components with Thicknesses Over Failure Threshold), P1.2022-0009, 0010 (Scully Supplemental Report), P1.2002-0007 (CTL/Krantz Supplemental Report), P1.2018-0009, 0010, 0011, 0012 (SGH/Rutila Supplemental Report), Trial Transcript at 2/19 Vol.II p.98 (11) –

p.99(15), p.104 (3-14), p.110 (16) – p.112 (8)(Scully Testimony). Thus, premature failures are predicted by Dr. John Scully. *Id.*

As set forth in the peer-reviewed literature, consensus standards, the opinion of several experts in the field, and the expert opinion of Dr. John Scully, the use of real world components under real world exposure conditions and durations of exposure provide more comprehensive and accurate information than the use of copper reactivity coupons, particularly if the coupons are deployed for short periods (such as less than one year). P1.1843-0001 (ASTM Standard for Corrosion Tests, recommend exposures over one year to account for seasonal variation and other variables), P2.0236-0001 (Perkins, Corrosion Manual), P2.0205-0009 (Tran 2003), P1.2051-0001, 0002 (Literature Regarding Corrosion Assessment of Real Components), P1.2052 (List of Individuals Contacted regarding use of Real Components), Trial Transcript at 2/19 Vol.II p. 108(17-25) (Scully Testimony). Nevertheless, the use of copper reactivity coupons may provide useful corrosion information, particularly when the real world components are not available for testing. P2.0228-0001 (Sinclair, Corrosion Manual), P2.0236-0001 (Perkins, Corrosion Manual). The limitations of copper reactivity coupons are that they tend to underestimate corrosion thicknesses particularly when deployed for short durations of time. P2.0247-0002 (Dean, Corrosion Text), P1.1843-0001 (ASTM Standard for Corrosion Tests), P2.0205-0009 (Tran 2003). Nevertheless, even with the limitations described above, the use of copper reactivity coupons in CDW homes produces data which also predicts premature electrical and electronic failures. The prediction of failure of electronic and electrical components (standardized to one year) in Florida and Louisiana CDW homes is also confirmed by the Knauf expert, Dr. Sandy Sharp, based on Dr. Sharp's copper reactivity coupon data from MeadWestVaco (MWV) and Dr.

Sharp's own published industrial electrical and electronic equipment corrosion failure threshold. P1.2056-0001 (FRE 1006 Florida, Louisiana, and Virginia Coupon Data), Deposition of Sandy Sharp (2/5/10) at 2/22 Vol.II p.39(17) – p.40(1), p.40 (7-9), p.42(5-14) (Sharp Testimony), Trial Transcript at 2/19 Vol.II p.102 (15) – p.03(10) (Scully Testimony). The CPSC also utilized copper reactivity coupons in the 51 Home Study and this process revealed that the corrosion thickness measurements on these coupons from CDW homes in Virginia, Florida, and Louisiana exceed the 300 angstrom failure threshold for 30 days and also predicted premature failures. P1.0019-0084, 0085, 0086, 0129 (CPSC 51 Home Study), Trial Transcript at 2/19 Vol.II p.111 (3-10) (Scully Testimony). Thus, based on measuring the thickness of the corrosion product on real world components in four different laboratories (Sandia, Scully/U Va, CTL/Krantz, and SGH/Rutila), and on copper reactivity coupons in two different laboratories (MWV and CPSC); these six different laboratories predict premature electrical and electronic failures in CDW homes due to the corrosivity of the environment produced by Chinese drywall. P1.2022-0009, 0010 (Supplemental Scully Report), Trial Transcript at 2/19 Vol.II p.10(10) – p.112(15), p.100(23) – p.101(16), p.104 (3-14) (Scully Testimony).

In summary, by any recognized standard, high levels of corrosive gases are present in the representative homes. This condition is clearly irritating and harmful to residents and destructive to property. It has to be remediated. The challenge for the Court is to determine the scope of this remediation.

#### **E. SCOPE OF REMEDIATION**

The evidence supports the conclusion that the appropriate remediation for the Plaintiff-intervenor homes includes the removal of all drywall, all electrical wiring, the entire HVAC

system, and many other items such as appliances, carpet, cabinetry, trim work and flooring. P1.1888-0003 (Beazer Scope of Remediation), P1.2058-0001 (Wright Scope of Remediation), Trial Transcript at 2/19 Vol. I at 77 (4) - 84 (24) (Phillips Testimony), Trial Transcript at 2/22 Vol. I p. 98 (13-21), 99 (16-22) (Rutila Testimony), Trial Transcript at 2/22 Vol. II p. 28 (10-13) (Rutila Testimony). The scope of this remediation is supported by both the scientific and practical evidence presented. Trial Transcript at 2/22 Vol. II p. 28 (10-13) (Rutila Testimony), p. 69 (2-10) (Wright Testimony).

The scientific evidence demonstrated that corrosion has damaged most components that contain copper or silver. P1.2016-0109 (SGH Original Report), Trial Transcript at 2/22 Vol. II p. 28 (4-6), (10-13) (Rutila Testimony). The practical evidence demonstrated that selective removal of only CDW is not feasible or cost-effective in this case. Trial Transcript 2/19 Vol. I p. 75 (10-25) (Phillips Testimony). The practical evidence further revealed that attempting to gently remove, store or clean or protect carpet, cabinetry or flooring is not feasible or cost-effective. P1.2050-0003 (Summaries of Cost Estimates), Trial Transcript at 2/19 Vol. I p.79 (1-13) (carpets), p.77 (18-20) (cabinets), p.86 (2-19) (wood floors) (Phillips Testimony). The practical evidence also indicates that items such as trim work and base boards will likely be ruined or extensively damaged when the drywall is removed. P1.2016-0087 (SGH Original Report), Trial Transcript 2/19 Vol. I p. 87 (2-6) (Phillips Testimony), Trial Transcript at 2/22 Vol. II p. 91 (13-16) (Wright Testimony). The Court will now discuss the details of and justification for the scope of this remediation.

**1. All Drywall in the Plaintiff-intervenor Homes Needs to be Removed & Replaced**

As indicated above, the Chinese drywall in the Plaintiff-intervenors' homes emits a foul

odor, irritates the human body, and emits sulfur gases which corrode copper and silver, metals of which most electronic and mechanical objects are made, thus reducing these objects life span and posing a fire risk and making the homes hard, if not impossible, to live in. Accordingly, all Chinese drywall must be removed from the Plaintiff-intervenors' homes. There seems to be little or no dispute on this issue. There is dispute, however, over the scope of remediation where the home contains both Chinese drywall and non-Chinese drywall. The issue is whether all drywall should be removed or only the problematic drywall in this case. The overwhelming evidence reveals that in such mixed structures it is necessary to remove all the drywall, both Chinese and other, for the following reasons.

- a. Drywall sales and delivery records, where available, lack the reliability and precision necessary to locate all of the Chinese drywall in a mixed drywall home.*

During the construction phase of the Intervenors' homes, available sales records from Venture Supply, Inc., showed that between 45 and 212 sheets of CDW were delivered to each of these homes. P1.2016-0017, 0018 (SGH/Rutila Original Report), Trial Transcript at 2/22 Vol. I p.5 (5-9)(Michaux Testimony), Trial Transcript at 2/22 Vol. II p.17 (5-9)(Rutila Testimony), 2/22 Vol. II p.53 (14-17)(Orlando Testimony). Trial Transcript at 2/19 Vol. I p.22 (11-13)(Opening Statement). In some, but not all cases, additional "stacking" records were provided, indicating the number of domestic boards as opposed to CDW which were placed on a given Plaintiff-intervenors' floor. Trial Transcript at 2/22 Vol. II p.19 (10-18) (Rutila Testimony). In the home with the second least number of boards (45 boards in the Michaux home according to these Venture records), Chinese drywall was found to be scattered among all three floors of the home. Trial Transcript at 2/22 Vol. I p.5 (5-9), p.12 (24) - p.13(6) (Rutila Testimony). Trial Transcript

at 2/22 Vol. I p.5 (5-9)(Michaux Testimony). In another Intervenor family's home (Baldwin), the stacking records indicated 77 sheets were placed only on the first floor of the home. The second floor air conditioning zone of the Baldwin home, which is fed by air wholly from this floor, has suffered copper sulfide corrosion from gases released by CDW. Trial Transcript at 2/22 Vol. II p.20 (6-15) (21-24) - p.21 (3)(Rutila Testimony). The second floor of the house also has light switches which have suffered silver sulfide corrosion from gases released by CDW.

P1.2049-0008 to -0011 (SGH analysis of Baldwin light switches showing silver sulfide corrosion) P3.0636-0001 (Schematic of second floor, with sample locations), Trial Transcript at 2/22 Vol. II p.20(6-15), p.22(3-15)(Rutila Testimony). The experts retained by Knauf documented second floor switches and outlets that had suffered visible copper sulfide corrosion.

P1.2003-3686 (Floor plan with corrosion locations), Trial Transcript at 2/22 Vol., II p.24 (1-18)(Rutila Testimony). In a home with identical "stacking" records, testing by SGH has demonstrated that CDW has been scattered among domestic board on the second floor of a home that was supposed to be, according to the records, CDW free. P1.1870-0001-018 and 027,P1.2062-001 and 002 (Nguyen Venture and Porter Blaine records, photographs of Venture label cut from second floor), Trial Transcript at 2/22 Vol. II p.26(21) - p.(27)(15)(Rutila Testimony). Accordingly, the Court finds that these records were not sufficiently reliable to conclude that the second floor of the home did not contain CDW. P1.2028-0047 and 0048 (Venture and Porter records), Trial Transcript at 2/22 Vol. II p.17(5-13) (Rutila Testimony).

- b. The Knauf proposed method, or combination of methods, for selective drywall identification do not rise above the level of experimental, and lack the scientific reliability necessary to conduct a board-by-board removal system at the present time.*

Experts retained by Knauf suggested that using a combination of screening tools

(including XRF and the subjective color coding of wires) eliminated the need to remove all drywall in a home with mixed sources of drywall. For the reasons set forth in the Court's Order of February 18, 2010, granting the PSC's Daubert motion in part, the Court finds that handheld XRF is unreliable for the purpose of identifying CDW on a board-by-board basis. The Court similarly finds that the observation of corrosion on electrical and mechanical systems in homes informs the determination of whether the home, as a whole, suffers from corrosive attack associated with CDW as reflected in the screening definitions for Florida and CPSC set forth, *supra*. P1.1841-0001-0004 (FLA Case Definition), P1.1844-0001(CPSC Guidance Problem Drywall), Trial Transcript at 2/19 Vol. II p.8(1-24)(Smith Testimony), Trial Transcript at 2/22 Vol, II p.4 (22) - p.7 (5)(Rutila Testimony). Despite the utility of these methods for home characterization, they lack the precision and accuracy necessary to conduct individual board identification as evidenced by the decision by Florida and the CPSC to eliminate this method from any confirmatory testing. Trial Transcript at 2/22 Vol. II p.7 (18) - p.8(17)(Rutila Testimony). PSC expert Dean Rutila explained six reasons why observation of corrosion on a wire is not a reliable tool to be used for the purpose of selective identification and removal of CDW. The six reasons are: (1) CPSC and FDOH have determined that it is a screening tool, not a tool for CDW board by board identification; (2) no governmental or peer-reviewed endorsement exists for board by board identification; (3) it is an incorrect assumption that effects of corrosive CDW are only very localized-these gases actually disburse throughout the house; (4) there are no available receptacles next to many boards in house, e.g., "scarce" in ceilings; (5) it is impractical to determine where one drywall board stops and next one starts; and (6) there is no guarantee that all CDW contamination can be removed or certify the same to code officials.

Trial Transcript at 2/22 Vol.II p.9 (9) - p.10(2) (Rutila Testimony). Defendant Knauf provided expert reports extensively reporting on the visible corrosion of wires as well as findings from their field use of XRF. The Court finds that this method, like the handheld XRF gun, also produced "false negatives," e.g., concluding that ceilings and rooms within homes were CDW-free, when subsequent testing of the homes demonstrates CDW labels and follow-up laboratory testing confirmed that the board was Chinese and was releasing corrosive gases. P1.1851-0003 to 0005, 0029 to 0051 (Streit Supplemental Data, ICP and sulfur offgas studies show Orlando and Baldwin boards deemed not CDW, are in fact CDW and do offgas at excessive levels), Trial Transcript at 2/22 Vol. II p.34 (8-25) (Baldwin Testimony), Trial Transcript at 2/22 Vol. II. p.58 (17) - p.59(10) (Orlando Testimony). The intervenor homes have suffered corrosive attack and, in order to make the plaintiff whole, any system that lacks the ability to definitely identify the offensive drywall is unacceptable and rejected by this Court. The regulatory and scientific record demonstrates that removing all drywall from a mixed drywall home is the only method that ensures this goal is obtained.

*c. Removal of all drywall in a mixed home is efficient and cost effective*

Large Florida homebuilders with extensive experience in CDW remediation have determined that removal of all drywall in affected homes is efficient and cost-effective, and that attempted selective identification and removal of CDW is neither efficient nor cost-effective. P1.1888-0001 to 0016 (Beazer scope of work, authorization), Trial Transcript at 2/19 Vol. I p.75 (10) - p.76 (2)(Phillips Testimony), Trial Transcript at 2/22 Vol. I p.98(13-21), p.99(6-15)(Rutila Testimony). The Court finds that removal of all drywall from a CDW home has been demonstrated repeatedly to be an efficient method of repair. Trial Transcript at 2/19 Vol. I p.

74(74-75), p.76(1-3), p.88 (11-14), p.93(5-11)(Phillips Testimony), Trial Transcript 2/19 Vol. II p.17 (14-19)(Smith Testimony). In testimony from homebuilders in Florida, coupled with photographic and videographic evidence, the Court finds that a home can be stripped of all drywall in a matter of hours. Trial Transcript at 2/19 Vol. II p.16 (25) - p.17(7)(Smith Testimony), Trial Transcript at 2/19 Vol.I p. 93 (5-11) (Phillips Testimony). For complete drywall removal, the removal process does not call for highly-skilled workers and removes drywall from the home rapidly and efficiently. Trial Transcript at 2/19 Vol. II p.17(14-19) (Smith Testimony), Trial Transcript at 2/19 Vol. I p.93 (5-11)(Phillips Testimony). In contrast, for attempted selective drywall removal, assuming that boards could be accurately identified (which the Court rejects), CDW would have to be "surgically excised" from a mixed CDW home, followed by the installation of new board in its place. The record shows this is neither practical nor cost-efficient. Trial Transcript at 2/19 Vol.I p.98(1-16)(Phillips Testimony), Trial Transcript at 2/19 Vol.II p.17(20) - p.18(7)(Smith Testimony). The Court finds that selective removal of drywall, with the corresponding need to patch the borders between old and new board, is time-consuming and requires a highly-skilled drywall installer to attempt to conceal the patch. Beazer Homes projected that to do this type of patchwork would require a four-to five-fold increase in cost per square foot, which estimate matched the estimate for such patch work provided by the experts retained by the PSC. Trial Transcript at 2/19 Vol.I p.95 (6-17), p.98 (1-6)(Phillips Testimony), Trial Transcript at 2/19 Vol. II p.17 (8-13)(Smith Testimony). The Court also finds that walls with certain types of finish applied are extremely difficult to repair as it is not possible to "feather" the finish. Repairs of this sort will not restore the home to its original condition. Trial Transcript at 2/19 Vol.I p.98 (1-16)(Phillips Testimony), Trial

Transcript at 2/19 Vol. II p.17(20) - p.18(7)(Smith Testimony).

*d. It is not practical or economical to detect, selectively remove, and replace individual boards of Chinese drywall*

Impacted homes were frequently built with a mixture of Chinese drywall and domestic drywall. P1.2016-0017, 0018 (Original Wright Report, summary of delivery records), P1.2016-0017, 0018 (SGH/Rutila Original Report, number of boards on delivery records) Trial Transcript at 2/19 Vol. I p.67 (2-14)(Phillips Testimony). The 4' x 12' Chinese drywall boards manufactured by Taishan were cut to fit a myriad of locations around these homes, resulting in sections of boards divided and installed as needed to fit the specific room. Trial Transcript at 2/19 Vol. I p.92(25) - p.93(4)(Phillips Testimony), Trial Transcript at 2/19 Vol. II p.12 (3-13)(Smith Testimony), P1.2050-0007, 0008, 0009 (Drywall layout diagrams by Ron Wright). Trial Transcript at 2/22 Vol. II p.74 (1-9) (Wright Testimony). The Court received evidence of a typical home drywall installation that included a closet with many small pieces of drywall segments and a ceiling with 11 segments of drywall. Trial Transcript at 2/19 Vol. I p.15 (6-9)(Opening Statement), Trial Transcript at 2/19 Vol. II p.14(1-5)(Smith Testimony). P1.2050-0007, 0008, 0009 (Drywall layout diagrams by Ron Wright). In rooms with ceilings greater than 8 feet in height, drywall installers frequently install a narrow band of drywall to make up the distance between two horizontal boards (8") and the ceiling. Trial Transcript at 2/19 Vol. I p.26 (2-5)(Opening Statement), Trial Transcript at 2/19 Vol. II p.30 (20-24)(Smith Testimony). P1.1803-0121, 0122 (Photos of Ron Wright holding sections of drywall at Beazer home). As a large drywall board is cut to fit a given area, the remaining portion of the board is set aside for use in an area of the home that requires a similarly sized board. In this way, a single board will frequently be cut into segments that are within a room, a floor, and a home. Trial

Transcript at 2/19 Vol. I p.26(25) - p.27(7)(Opening Statement), Trial Transcript at 2/19 Vol. II p.12(14-22)(Smith Testimony). P1.2050-0007, 0008, 0009 (Drywall layout diagrams by Ron Wright). Once installed, the finishing process for drywall, which includes taping and multiple layers of drywall finish followed by sanding and painting, renders the demarcation between drywall segments almost impossible and certainly impractical to detect. Trial Transcript at 2/19 Vol. I p.75(16-21), p.92 (2-16)(Phillips Testimony), Trial Transcript at 2/19 Vol. II p.12(23) - p.13(2)(Smith Testimony). P1.1803-0121, 0122 (Photos of Ron Wright holding sections of drywall at Beazer home). Additionally, many of the drywall boards are placed behind kitchen cabinets, bathroom vanities, appliances, mechanical equipment, and other objects that further conceal their location. Trial Transcript at 2/19 Vol. I p.85(12-23)(Phillips Testimony), 2/22 Vol. II p.90(1-15) (Wright Testimony).

**2. All Electrical Wires in the Plaintiff-intervenor Homes Need to be Replaced**

*a. Scientific Reasons*

The electrical systems of the seven homes include copper low voltage wires which carry current to smoke detectors, fire alarms, and thermostats, among other devices. Trial Transcript at 2/22 Vol.I, p.98 (16-21) (Rutila Testimony). The homes also have copper high voltage electrical wires which carry current between electrical components such as circuit breakers, receptacles, and switches. Trial Transcript at 2/19 Vol.II, p.25(19-24) (Smith Testimony). Corrosive gases emitted from Chinese drywall cause significant damage to copper high and low voltage wires as a result of the buildup of thick films or corrosion product. P1.0060-0011, (CPSC/Sandia Report).

CDW also causes pitting to occur on wires as was demonstrated by the Sandia National Laboratories. P1.0060-0011, 0063 (CPSC/Sandia Report). Pits in the wires from the Plaintiff

intervenors' homes ranged from 10 microns to 29 microns in depth. P1.2002-0007 (CTL/Krantz Supplemental Report), P1.1808-0001 (ASTM Pitting Evaluation Standard), Trial Transcript at 2/19 Vol. II p.83(5-7)(Scully Testimony). It is highly probable that there exist in the Plaintiff intervenors' homes corroded wires with a distribution of pit sizes, some of which would be larger than the deepest pit measured by CDW investigators. P1.1808-0001 (ASTM Pitting Evaluation Standard), P1.1806-0001, 0002 (ASTM Standard on Statistics and Corrosion), Trial Transcript at 2/19 Vol. II p.68(14-15) (Scully Testimony). This further confirms the corrosion is due to the exposure to Chinese drywall.

In failure analysis, where the concern is the "weakest link" because the goal is to prevent failures and protect against life safety issues connected to failures (i.e., corrosion increases resistance which increase heat and generates a fire risk), one must focus on the most vulnerable components. P1.0195-0017, 0028 (Abbott 1993, MTI #38), Trial Transcript at 2/19 Vol. II p. 69(3-13) (Scully Testimony), Trial Transcript at 2/19 Vol. II p. 159(9-22) (Galler Testimony), Deposition of Jonathan R. Barnett (2/12/10) at p. 46(12-23). For example, in failure analysis of a copper tube, it is important not only to look at average thickness of the copper material to determine if a leak is possible, but more importantly to look at the weakest link in the tube. *Id.* Thus, the maximum corrosion thickness and the maximum pit depth are important considerations in failure analysis. *Id.* Wires from homes without CDW, namely the control homes, did not show the severe corrosion thicknesses associated with predicted failure, did not show thick copper sulfide deposits, and did not show severe pitting found on the wires from CDW homes. P1.2022-0045 (Scully Original Report), P2.2022-0041, 0042, 0048 (Supplemental Scully Report), Trial Transcript at 2/19 Vol. II p. 109(15-17) (Scully Testimony).

The insulation jackets on electrical wires do not adequately protect them from corrosive attack. P1.2001-0017 (Original CTL/Krantz Report), P1.2022-0053, 0058 (Supplemental Scully Report), Trial Transcript at 2/19 Vol. II p. 98(19)- p.99(3) (Scully Testimony), Trial Transcript at 2/22 Vol. II p. 79(22)- p.80(8) (Wright testimony), Deposition of Lori Streit (2/16/10) at 2/22 Vol. I p. 64(7-23). Reactive sulfur gases permeate the sheathing and corrode wires from the inside out. *Id.* This penetration of wire insulation has been demonstrated in both "lamp cord" wires and under the jackets of Romex high voltage wire on the grounding wire which lacks its own insulation. P1.2022-0053, 0058 (Supplemental Scully Report) (evaluation lamp chord, BDM-5), P1.2001-0017 (Original CTL/Krantz Report) (evaluation of ground wire under Romax, BDM-39), Trial Transcript at 2/19 Vol. II p. 98(19)- p.99(3) (Scully Testimony), Trial Transcript at 2/22 Vol. II p. 79(22)- p.80(8) (Wright Testimony), Deposition of Lori Streit (2/16/10) at 2/22 Vol. I p. 64(7-23) (Streit Testimony). The corrosive attack from CDW occurs even on insulated wires within the walls of the home. *See* P1.1981 (switch box from Beazer home). This was demonstrated on the marked wire attached to a light switch box taken from one of the Beazer homes. *Id.* The corrosive attack also occurs on lamp cords which are in the center of a room away from drywall sources. P1.2022-0053, 0058 (Scully Supplemental Report), Trial Transcript at 2/22 Vol. I p. 122(20)- p.123(24) (Rutila Testimony).

The corrosive environments in these homes will result in premature failures of the electrical system according to the expert analysis of both PSC experts and at least one Knauf expert. P1.2001-0019, 0020, 0021 (CTL/Krantz Original Report, HVAC Coil Failure due to Corrosion), P3.0625-0001, 0002 (FRE 1006 Summary of HVAC Coil Failure Data), P1.2053-0001 (Virginia Corrosion Thicknesses Exceed Failure Standard), Trial Transcript at

2/19 Vol.II p.55(24) – p.156(17) (Galler Testimony), Trial Transcript at 2/19 Vol.II p.100(17) – p.101(16), p.152(22) – p.153(1) (Scully Testimony), Trial Transcript at 2/22 Vol.I p.90(3-23) (Barnett Testimony proffer) (The PSC tenders Dr. Barnett, and the Court accepts him as, an expert in Engineering and Fire Safety. Trial Deposition of Jonathan Barnett (2/12/10) at p. 11(14)-18(22), P1.2015-0019 – P1.2015-0024 (Barnett Report, C.V.).

It is not feasible to clean the wires of corrosion product to render them free of risk of future failure. Trial Transcript at 2/19 Vol. II p. 84(3-11) (Scully testimony), Trial Transcript at 2/19 Vol. I p. 80(15-22) (Phillips testimony), Trial Transcript at 2/22 Vol. I p. 125(2-17) (Rutila testimony). To do this, one would have to remove the wire, remove the insulation on the wire, clean the wire, and reinstall the wire insulation. *Id.* Such a process is not only time consuming but needs special equipment and expertise. *Id.*

The Romex insulation utilized in Plaintiffs' homes was type NM which is not sufficient for corrosive environments. Trial Transcript at 2/22 Vol. I p. 124(3, 12-14, 20-21) (NM not suitable for corrosive environment) (Rutila Testimony), Trial Transcript at 2/22 Vol. I p. 125(18-23) (Wires must be removed once exposed) (Rutila Testimony, Trial Deposition of Jonathan R. Barnett (2/12/10) at p. 27(13-16), 38(15)-39(4). Engineering standards require the replacement of wires which have been exposed to this environment. *Id.*

Building codes are drafted for life safety purposes and generally set a minimum level of safety. Trial Deposition of Jonathan Barnett (2/12/10) at p. 19(10)-20(19). A building code is usually prescriptive and not discretionary. Trial Deposition of Jonathan Barnett (2/12/10) at p. 19(10)- p.20(19). Corrosion on active residential wiring is a violation of the national safety code as well as the safety and building codes of the various states. Trial Deposition of Jonathan

Barnett (2/12/10) at p. 26(13)- p.29(16), 38(5)- p.38(18), p.39(7)- p.40(21), 43(9)- p.43(24), p. 46(1)-48(18), p. 55(3)- p.56(1), p. 120(4)- p.122(10); P1.1807-0003, -0006 (Excerpt from Electrical Code); P1.1818-0001 (ASTM B-3);P1.1819-0003 (NFPA 921, Guide for Fire and Explosion Investigations, section 8.9.2.3 "Poor Connections");P2.0195-0027 (Abbott, Atmospheric Corrosion on Control Equipment, 1993); P2.0202-0004 (Chudnovsky, Corrosion of Electrical Conductors, 2008); P2.0234-0005 (Glowing Connections, Fire Technology Journal, Vol.18, No. 4, 1982). The "corrosive residue" on, and "deterioration by corrosion" to, the wires are violations of electrical codes promulgated by Virginia. P1.1814-0003 (Integrity of Electrical Equipment), P1.1817-0003 (Integrity of Electrical Equipment), Trial Transcript at Trial Transcript at 2/22 Vol. II p. 77(8-13) (Wright Testimony), Deposition of Jonathan R. Barnett (2/12/10) at p. 35(18-24)).

*b. Economic & Practical Reasons*

It is practical to remove the wiring while all the drywall is out of the home because of the ease of access to the cavities where the wiring is located. The replacement of the electrical wires, requires access to wall and ceiling cavities currently covered by drywall. Trial Transcript at 2/22 Vol. II p.30(4-13) (Rutila Testimony), Trial Transcript at 2/22 Vol. II p.79(9-16), p.82(20) - p.83(22) (Wright Testimony). The Court was presented evidence that the network of wires in the home, including low and high voltage, phone, cable, and other system wires, is extremely complex and dispersed throughout the ceilings and walls. *Id.* Electrical wires are stapled in place within the wall cavities pursuant to applicable building codes. Trial Transcript at 2/22 Vol. II p.80 (11-14), p.81(3-22), p.82(13) - p.83(3) (Wright Testimony). These wires cannot be removed without gaining access to the wall cavity. *Id.* The evidence also demonstrates that replacement

of all wiring is warranted because of practical cost considerations. P1.2050-003 (Summaries of Cost Estimates); Trial Transcript at 2/19 Vol.I pg.79(22)-pg.80(10), p.81(1-6).

The Court finds that it both economical and practical to remove all the wiring while the drywall is gone, rather than removing only some of the wiring at this time and then risk later have to tear down the drywall again in the case that additional wiring exposed to the sulfur gases is harmed or fails. Additionally, the low-voltage wiring supporting life and safety devices such as fire alarms and smoke detectors should be removed and replaced because of the low cost of replacement when compared with the high risk of injury or death if these devices are not functioning properly.

### **3. All Copper Pipes in the Plaintiff-intervenor Homes Need to be Replaced**

#### *a. Scientific Reasons*

Copper pipes are utilized to carry water and copper plumbing components form integral parts of the plumbing system, including risers (attached fixtures to delivery lines), shower control devices, pressure regulators, and a variety of other applications. Trial Transcript at 2/22 Vol. I p. 108(19-22) (Rutila Testimony). The corrosive gases responsible for destroying copper in wiring have also damaged the plumbing and mechanical copper components. P1.1848-0001, 0002 (Rutila Dew Point Analysis), P1.2016-0421, 0422, 0424 (SGH/Rutila Original Report), Trial Transcript at 2/22 Vol. I p.108(19) - p.109(2) (Rutila Testimony), Trial Transcript at 2/19 Vol. II. p.81(25) - p.83(14), p.88(25) - p.89(17) (Scully Testimony). This corrosion caused pitting which leaves corrosion product in the wall of the pipe. *Id.* From a scientific standpoint, under normal operating conditions, humidity and microscopic moisture on these pipes (or other copper surfaces such as coils or wire) will create the conditions for the deepening of these pits by the reactivation

of the corrosion inside the pit, regardless of whether or not the defective drywall is removed. P2.0241-2804, 2805 (Jacobs 2000), P1.1836-0021 (ISO 11844-1 Corrosion Standard), P2.0228-0011 (Sinclair, Corrosion Manual), P2.0070-0006, 0010, 0015, 0016(Freeman 2009), Trial Transcript at 2/19 Vol.II p.84(19) - p.87(8) (Scully Testimony). The evidence supports the conclusion that copper pipes with significant corrosion and pits cannot be adequately "cleaned." Trial Transcript at 2/19 Vol.II p.84(3-11) (Scully Testimony).

*b. Economic & Practical Reasons*

The plumbing systems in homes are impossible to remove or replace in walls and ceilings when drywall is present. Trial Transcript at 2/19 Vol.II at p.23(17) - p.24(3) Smith Testimony, Trial Transcript at 2/22 Vol. II p.90 (1-15) (Wright Testimony). Thus it is practical to remove the plumbing while all the drywall is out of the home because of the ease of access to the cavities where the plumbing is located. *Id.* Also from a practical standpoint, builders have rejected the prospect of "cleaning" the corrosion off of copper components, finding it is more cost-effective and less time-consuming to simply remove and replace them. Trial Transcript at 2/19 Vol. I p.79(22) - p.81(6) (Phillips Testimony).

**4. The HVAC Units in the Plaintiff-intervenor Homes Need to be Replaced**

*a. Scientific Reasons*

Heating, ventilating, and air-conditioning ("HVAC") units contain both copper and silver components, all of which are corroded by the sulfur gases emitted by Chinese drywall. KPT experts agree that the HVAC systems in the seven (7) Plaintiff homes have been badly corroded by CDW. P1.2022-0009 (Scully Supplemental Report), Trial Transcript at 2/22 Vol. I p. 111 (12-16) (Rutila Testimony). For example, the air handlers of the HVAC systems of the

Plaintiff-intervenor homes are corroding in multiple areas including the coils, circuit board, and contactor switch. P1.2018-0006 (SGH/Rutila Report), P4.0002-0054 (Galler Report), P1.2020-0028 to 0034 (Galler Original Report for Air Handling Contactor), Trial Transcript at 2/22 Vol. I p.110 (6-21), p.113 (7) - p.114 (10) (Rutila Testimony), Trial Transcript at 2/19 Vol. II p. 146 (1-25), p.153 (8) - p.155 (5) (Galler Testimony).

The copper coils of HVAC systems are similarly failing because of the sulfur gas emitted from CDW. P1.2006-0016 (Bailey Report) (The PSC tenders Ronald Bailey, and the Court accepts him as an expert in Engineering and Indoor Air Quality, P1.2006-0001 (Original Bailey Report, C.V.), P1.2016-0078 (SGH Original Report) Trial Transcript at 2/22 Vol. I p. 111 (12-16) (Rutila Testimony). The coils are part of the air handler in the HVAC system. P1.2016-0067 (SGH Original Report), Trial Transcript at 2/22 Vol. I p. 104 (18-19), p. 110 (6-21) (Rutila Testimony). The sulfur gas from CDW causes a heavy black corrosion on HVAC coils. P1.2016-0077 (SGH Original Report), Deposition of Lori Streit (2/16/10) at 2/22 Vol. I p. 52 (6-10), p.68 (25) - p.69 (17) (Streit Testimony). The sulfur gas from CDW causes copper sulfide corrosion on HVAC coils. P1.2016-0077 (SGH Original Report), Trial Transcript at 2/19 Vol. II p. 61 (22-25) (Scully Testimony). The copper sulfide corrosion causes pitting in the HVAC coils. P1.2001-0018 to 0020 (CTL Original Report), Deposition of Lori Streit (2/16/10) at 2/19 Vol. II p. 65 (1-23), p. 66 (1) (Streit Testimony). The copper sulfide corrosion in the pits of the HVAC coils will continue even after the CDW is removed and replaced. P1.2021-0013 (Scully Original Report), Trial Transcript at 2/19 Vol. II p. 85 (1-25), p. 86 (1-13) (Heischober Testimony). The corrosion caused by CDW causes the copper to develop a spongiform texture. Trial Transcript at 2/19 Vol. II p. 80 (11-25), p. 81 (1-20) (Scully Testimony); see also

P1.060-0010 and 0011 (CPSC/Scandia Report discussing spongiform texture. ). The corrosion caused by CDW has resulted in multiple failures of HVAC coils in Plaintiffs' homes. P3.0635 (RE 1006 Summary of HVAC Coil Failure Data), Trial Transcript at 2/22 Vol. I p.111 (12-16) (Rutila Testimony).

By contrast the HVAC coils from control homes do not demonstrate corrosive attacks. P1.2016-0066 (SGH Original Report with photo of shiny HVAC copper tubes in control home), Trial Transcript at 2/19 Vol. I p.111(23) - p.112(2) (Scully Testimony), Deposition of Lori Streit (2/16/10) at 2/22 Vol. I p. 47 (10-17) (Streit Testimony), Trial Transcript at 2/22 Vol. I p. 96 (7-8), p. 111 (16) (Rutila Testimony). The HVAC coils from control homes have no copper sulfide corrosion. P1.2016-0066 (SGH Original Report), P1.2018-0007 (SGH/Rutila Report), Trial Transcript at 2/19 Vol. II p.154 (11-23) - p.155 (2) (Galler Testimony), Trial Transcript at 2/22 Vol. I p. 96 (7-8), p.111 (16) (Rutila Transcript), Deposition of Lori Streit (2/16/10) at 2/22 Vol. I p. 47 (10-17) (Streit Testimony).

Additionally, the corrosion caused by CDW in the Virginia homes attacks the brazes that connect copper pipes. P1.2001-0019 (CTL Original Report), Trial Transcript at 2/22 Vol. I p.108 (22-25), p. 109 (1-12) (Rutila Testimony), Trial Transcript at 2/22 Vol. I p.111 (4-8) (Rutila Testimony).

The circuit boards of the air handler are also corroding. P1.1866-0003 (Photo of corrosion on Morgan HVAC circuit board), Trial Transcript at 2/22 Vol. I p.114 (11-25), p. 115 (1-5) (Rutila Testimony), Trial Transcript at 2/19 Vol. II p. 153 (8-25), p. 154 (1-25), p. 155 (1-2) (Rutila Testimony). Corrosion on circuit boards increases resistance which leads to premature failure. P1.2020-0003 (Galler Original Report), Trial Transcript at 2/19 Vol.II, p. 89 (15-25), p.

90 (1-23) (Scully Testimony). The contactor switches of the air handler are also corroding. P1.2020-0028 to 0034 (Galler Original Report), Trial Transcript at 2/22 Vol. I p.113 (10-25, p. 114 (1-10) (Rutila Testimony), Trial Transcript at 2/19 Vol. II p. 146 (1-25) (Rutila Testimony). Corrosion on contactor switches increases resistance which leads to failure. P1.2020-0028 to 0034 (Galler Original Report), Trial Transcript at 2/19 Vol. II p.130 (3-16) (Galler Testimony), Trial Transcript at 2/22 Vol. II p. 146 (21-25) (Galler Testimony).

Due to the corrosion in multiple areas of the air handler units in these homes, the entire unit must be replaced. P1.2016-0109 (SGH Original Report Conclusions), Trial Transcript at 2/22 Vol. II p. 87 (13-25), p. 88 (1-11) (Wright Testimony). The air handler units of other national builders such as Beazer and Lennar exhibit similar problems and are being replaced. P1.1888-0003 (Beazer Scope of Work), P1.2016-0105 (SGH Original Report discussing Lennar scope of repair), Trial Transcript at 2/22 Vol. I p.116 (23-25). p.117 (1-11) (Rutila Testimony).

The refrigerant that causes cooling in an HVAC system is circulated through a copper pipe called a "line set." P1.1848-0001 and 0002 (Rutila Analysis of Dew Point); Trial Transcript at 2/19 Vol. II p. 21 (7-10) (Smith Testimony), Trial Transcript at 2/22 Vol. I p. 104 (8-14), p. 117 (4-6) (Rutila Testimony). The line set pipe connects the interior air handling units to the outside compressor units. Trial Transcript at 2/19 Vol. II p.21 (7-10) (Smith Testimony), Trial Transcript at 2/22 Vol. I p. 104 (8-14), p. 116 (23-25), p. 117 (1-6) (Rutila Testimony), Trial Transcript at 2/19 Vol. I p. 21 (11-15) (Morgan Testimony). The line set pipes run through the interior walls from the air handler unit until it exits the house to connect to the air compressor. Trial Transcript at 2/19 Vol. II p. 22 (21-25), p. 23 (1-16) (Smith Testimony). The line sets in these homes have a heavy black corrosion caused by CDW sulfur gasses. P1.1871-0002 and 0003

(CTL Supplement No. 2), Trial Transcript at 2/19 Vol. II p. 21 (20-25), p. 22 (1-3, 9-10) (Smith Testimony), Trial Transcript at 2/22 Vol. I p. 116 (9-16) (Rutila Testimony), Trial Transcript at 2/22 Vol. I p. 105 (8-17) (Rutila Testimony). When the temperature of any copper pipe, such as the line set, in a house drops below the "dew point," moisture will form and make the pipe particularly susceptible to the CDW sulfur gases. P1. 1848-0001 and 0002 (Rutila Analysis of Dew Point), Trial Transcript at 2/22 Vol. I p. 103 (6-16) (Rutila Testimony). Cross-sections of the line set pipe in these homes demonstrate deep pitting caused by CDW sulfur gasses. P1.1871-0002, 0003 (CTL Supplement No. 2), Trial Transcript at 2/19 Vol. II p. 64 (10-15) (Scully Testimony). The line set pipes of other national builders such as Beazer and Lennar exhibit similar problems and are being replaced. P1.1888-0003 (Beazer Scope of Work), Trial Transcript at 2/22 Vol. I p.116 (23-25), p. 117 (1-11) (Rutila Testimony), Trial Transcript at 2/19 Vol. I p. 77 (2-4) (Streit Testimony). The heavy corrosion to the line set pipes requires replacement. Trial Transcript at 2/22 Vol. II p. 23 (20-25) (Wright Testimony).

*b. Economic & Practical Reasons*

The "line-sets" described above are installed in a home in one continuous piece from outside compressor to the air handler unit. Trial Transcript at 2/19 Vol.I p.76 (8-16) (Phillips Testimony), Trial Transcript at 2/19 Vol.II p.21 (7-10)(21-25), p.22 (21) - p.24(3) (Smith Testimony). For upstairs air handler units, these lines frequently run through interior walls and ceilings. *Id.* These lines are installed first, and wiring, insulation, and other equipment are installed over them, rendering them impossible to access for removal and replacement without first removing all drywall. *Id.* Replacement of the line set pipes requires removal of all drywall in those areas of the walls where the pipe runs. Trial Transcript at 2/19 Vol. II p. 23 (17-25), p.

24 (1-3) (Smith Testimony). Accordingly, it makes sense to replace these items since they are suffering from corrosion and are most easily removed and replaced while the drywall is gone.

The outside compressors may need to be replaced in these homes, and should be evaluated on a case-by-case basis. P1.2006-0016 (Bailey Original Report), Trial Transcript at 2/22 Vol. II p. 88 (4-11) (Wright Testimony), Trial Transcript at 2/22 Vol. II p. 27 (4-25), p. 28 (1-13), p. 30 (4-23) (Rutila Testimony). The outside compressors demonstrate excessive wear from excessive operation. Trial Transcript at 2/22 Vol. I p. 116 (23-25), p. 117 (1-11) (Rutila Testimony), Trial Transcript at 2/22 Vol. II p. 30 (4-23) (Rutila Testimony). The excessive operation of the compressor is caused by attempting to circulate coolant through a failed and corroded coil in the air handling unit. Trial Transcript at 2/22 Vol. I p. 98 (22-25), p. 99 (1-4); p. 30 (4-23) (Rutila Testimony). The outside compressor may also need to be replaced to match the connections on new air handling units, and should be evaluated on a case-by-case basis. P1.2006-0016 (Bailey Original Report), Trial Transcript at 2/19 Vol. I p. 98 (22-25), p. 99 (1-5), p. 117 (7-11) (Rutila Testimony), Trial Transcript at 2/22 Vol. II p. 88 (4-11) (Wright Testimony). The connections between the air handler and compressor have been altered due to changes in refrigerant regulations. P1.2006-0016 (Bailey Original Report).

The duct work that runs from and to the air handling unit must be replaced. P1.2006-0017 (Bailey Original Report), Trial Transcript at 2/19 Vol. I p. 77 (25), p. 78 (1-11) (Phillips Transcript), Trial Transcript at 2/22 Vol. II p. 88 (21-23) (Wright Testimony). Particulate matter from the CDW is in the ductwork. PP1.2006-0017 (Bailey Original Report), Trial Transcript at 2/19 Vol.I, p. 78 (3-5) (Phillips Testimony). The duct work cannot be adequately cleaned. P1.2006-0018 (Bailey Original Report), Trial Transcript at 2/19 Vol. I p. 78

(6-9) (Phillips Testimony). The contractors for these homes could not obtain quotes to even attempt cleaning of the ductwork. P1.2050-0003 (Summaries of Cost Estimates), Trial Transcript at 2/19 Vol. I p.47 (2-10) (Opening Statement). Even if attempts could be made at cleaning the ductwork, the cost of cleaning would be greater than simply replacing the ductwork. P1.2027-0023 (Wright Report), Trial Transcript at 2/19 Vol. I p. 77 (25), p. 78 (11) (Phillips Testimony), Trial Transcript at 2/22 Vol. II p. 88 (12-23) (Wright Testimony). Other national builders like Beazer and Lennar are replacing the duct work. P1.1888-0003 (Beazer Scope of Work), Trial Transcript at 2/19 Vol. I p. 77 (25), p. 78 (1-11) (Phillips Testimony).

**5. Selective Electrical Devices & Appliances in the Plaintiff-intervenor Homes Need to be Replaced**

*a. Scientific Reasons*

Silver is a very conductive metal and is used in the electronic contacts in practically every device that carries electrical current. P1.2020-0004 (Galler Original Report), Trial Transcript at 2/19 Vol. II p. 128 (12–24) (Galler Testimony). For example, silver is present in circuit breakers, light switches, thermostats, computers, televisions, and generally "[a]nything that has a button." P1.2020-0004 (Galler Original Report), Trial Transcript at 2/19 Vol. II p. 128(13)– p.129(8) (Galler Testimony). It is a preferred metal because it has good resistance to corrosion attacks from most sources. Trial Transcript at 2/19 Vol. II p. 157 (13–14) (Galler Testimony). However, like copper, its Achille's heel is sulfur. P1.2020-0004 (Galler Original Report), Trial Transcript at 2/19 Vol. II p. 157 (13–18) (Galler Testimony). Silver is readily corroded by sulfur. *Id.* When it is exposed to sulfur, silver sulfides are produced. Trial Transcript at 2/19 Vol. II p. 158 (6–10) (Galler Testimony); *see also* P2.0202 (Chudnovsky

2008).

When a sulfide corrosion product exists, it dramatically increases resistance of electrical current through the connection. *See* Trial Transcript at 2/19 Vol. II p. 129 (20–24) (Galler Testimony); *see also* P2.0202-0001 (Chudnovsky 2008). This increased resistance can cause either complete failure or excessive heating of the connection when energized. *See* Trial Transcript at 2/19 Vol. II p. 129 (25)– p.130 (2) (Galler Testimony); *see also* P2.0202-0001 (Chudnovsky 2008). Complete failure and/or excessive heat of a switch can lead to fires or other life safety problems, depending on the intended function of the switch. Trial Transcript at 2/19 Vol. II p.130 (3–14) (Galler Testimony). For example, a malfunctioning safety cut-off switch in a clothes dryer might cause a fire. *Id.*

Corrosion can also lead to premature failure of the electrical device or appliance. Trial Transcript at 2/19 Vol. II p. 130 (15–16); *see also* P2.0202-0001, et seq. (Chudnovsky 2008), P2.0195-0001, -0027, 0028 (Abbott, 1993 Fig. 1 (Effects of Film Thickness on Contact Resistance) and Fig 2. (Effects of Environmental Severity on Component Failure Mechanism)). The lifespan of devices with silver corrosion has been seriously diminished. Trial Transcript at 2/19 Vol. II p. 156 (10–13) (Galler Testimony). The silver corrosion found on the Plaintiffs' devices indicates that they were in a "Level III" or "Level IV" corrosive environment as measured on an objective corrosion scale. Trial Transcript at 2/19 Vol. II p.160 (6–9) (Galler Testimony). Level IV is the worst. *Id.* In a Level III environment, equipment failure rates increase by a factor of 100. Trial Transcript at 2/19 Vol. II p.160 (3–6) (Galler Testimony); *see also* P2.0195-0001, -0027, 0028 (Abbott, 1993, Fig. 1 (Effects of Film Thickness on Contact Resistance) and Fig 2. (Effects of Environmental Severity on Component Failure Mechanism)). The lifespan of devices

with silver corrosion can be decreased to a tenth or a quarter of its normal lifespan. Trial Transcript at 2/19 Vol. II p. 156 (14–17) (Galler Testimony).

Most of the appliances and electronics located in the representative homes need to be replaced due to corrosion on metallic contact surfaces and on other metallic components.

P1.2018-0012 (SGH/Rutila Report), Trial Transcript at 2/19 Vol. I p. 81 (18-25) (Phillips Testimony), Trial Transcript at 2/19 Vol. II at 156 (18-19) (Galler Testimony). As discussed above, the corrosion has damaged the copper wiring in the appliances and electronics.

P1.2018-0006 (SGH/Rutila Report), Trial Transcript at 2/19 Vol. II p. 156 (2-9) (Galler Testimony), Deposition of Lori Streit (2/16/10) at 2/22 Vol. I p. 69 (11-17) (Streit Testimony).

The corrosion also has damaged the silver contacts in the appliances and electronics.

P1.2018-0006 (SGH/Rutila Report), Trial Transcript at 2/19 Vol. II p.129 (16) - p.130 (2), p.141 (15-20) (Galler Testimony).

Refrigerators are particularly susceptible to damage from the sulfur gasses due to the cool copper lines and compressor which circulate refrigerant. P1.2018-0007 (SGH/Rutila Report).

They are also particularly susceptible to damage from the sulfur gasses due to the high air flow caused by the compressor fan. P1.2018-0008 (SGH/Rutila Report), Trial Transcript at 2/19 Vol. II p. 19 (2-14) (Smith Testimony).

Electronic systems in the Plaintiff-intervenors' homes houses have failed. P1.2018-0014 (SGH/Rutila Report, Appendix 1, Summary of Failures), Trial Transcript at 2/22 Vol. II pp. 11(20) - 12(5) (Rutila Testimony). Electronic systems in the Plaintiff intervenors' homes are damaged by the corrosion. P1.2020-0003 (Galler Report), Trial Transcript at 2/22 Vol. II p. 89 (15-20) (Wright Testimony), Trial Transcript at 2/19 Vol. II pp. 155 (24) - 156 (9) (Galler

Testimony). Electronic systems in the Plaintiff intervenors' homes are likely to fail before their normal and expected periods of use end. P1.2020-0003 (Galler Report), P1.2006-0018 (Bailey Report), Trial Transcript at 2/19 Vol. II p. 156 (10-17) (Galler Testimony). Examples of damaged or failed electronic systems include televisions, computers, and any other item with a circuit board. P1.2018-0014 (SGH/Rutila Report, Appendix 1, Summary of Failures), Trial Transcript at 2/19 Vol. II p. 12 (6-13) (Smith Testimony).

*b. Economic & Practical Reasons*

Replacement of electronic devices and appliances damaged by sulfur gases emitted by Chinese drywall makes sense under practical cost considerations. P1.2050-0003 (Summaries of Cost Estimates); Trial Transcript at 2/19 Vol.I pg.77. It is more cost effective to replace items such as smoke detectors, than to remove them from the home, transport them to and store them in a facility, and transport them back to the home. *Id.*

**6. Whether Flooring Needs to be Replaced**

*a. Carpet Must be Replaced*

The carpet in the houses cannot be adequately protected during the remediation process. P1.2027-022 (Wright Original Report), P1.2006-0015 and -0023 (Bailey Original Report), Trial Transcript at 2/19 Vol. I p. 79 (4-6) (Phillips Testimony), Trial Transcript at 2/22 Vol. II. p. 92 (10-14) (Wright Testimony). Attempting to remove and store the carpet during the remediation is not cost-effective. P1.2027-022 (Wright Original Report), P1.2006-0015 and -0023 (Bailey Original Report), P1.2050 (Summaries of Cost Estimates), Trial Transcript at 2/19 Vol. I p. 79 (6-13) (Phillips Testimony). The evidence indicates that it would be cheaper to replace the carpet than attempt storage and reinstallation. P1.2027-022 (Wright Original Report),

P1.2006-0015, 0023 (Bailey Original Report), Trial Transcript at 2/19 Vol. I p. 79 (11-13) (Phillips Testimony).

*b. Hardwood or Vinyl Flooring Must be Replaced*

The hardwood or vinyl flooring pose a challenge in some circumstances and in some climates. P1.2016-0089 (SGH Original Report), Trial Transcript at 2/19 Vol. I p. 86 (7-8) (Phillips Testimony). The unconditioned air during the remediation process can damage hardwood floors. P1.2016-0089 (SGH Original Report), Trial Transcript at 2/19 Vol. I p. 86 (11-17) (Phillips Testimony). Dust generated during the remediation process will intrude into the cracks and crevices of the flooring and may require resanding and refinishing the floors. P1.2006-0015 (Bailey Original Report), Trial Transcript at 2/22 Vol. II p. 92 (10-14) (Wright Testimony), Trial Transcript at 2/19 Vol. I p. 78 (2-5) (Phillips Testimony). In the representative cases, the evidence supports the conclusion that the hardwood or vinyl flooring must be replaced as part of the remediation. P1.2058-001 (Wright Scope of Remediation), Trial Transcript at 2/19 Vol. I p. 86 (11-19) (Phillips Testimony), Trial Transcript at 2/22 Vol. II p. 92 (10-16) (Wright Testimony).

*c. Tile Flooring May Need to be Replaced*

The evidence shows that tile flooring may be properly protected during the remediation process, and if this can be done, the Court finds that it does not need to be removed and replaced. In the case if the tile flooring is damaged, then it should be removed and replaced. Additionally, tile that is affixed to the drywall will be ruined during the drywall removal and should be replaced. 2/19 Vol. I, p. 82 (18-21) (Phillips Testimony).

**7. Items Which Must be Removed With the Drywall May Need to be Replaced**

*a. Cabinets Must be Replaced*

The cabinets in the houses must be removed to gain access to the drywall. P1.2016-0088 (SGH Original Report), Trial Transcript at 2/19 Vol. I p. 91 (10-16) (Phillips Testimony). The testimony reveals that it would not be cost-effective to attempt to gently remove the cabinets and store them in a climate-controlled storage unit. Trial Transcript at 2/19 Vol. I p. 83 (13-20) (Phillips Testimony), Trial Transcript at 2/19 Vol. II p. 20 (16-22) (Smith Testimony), Trial Transcript at 2/22 Vol. II pp. 107 (22-25) - 108 (1-2) (Wright Testimony). It is more cost-effective to replace the cabinets than attempt removal and storage. Trial Transcript at 2/19 Vol. I at p.83 (13-20) (Phillips Testimony), Trial Transcript at 2/22 Vol. II, p.107 (22-25) - p.108 (1-2) (Wright Testimony).

*b. Countertops Must be Replaced*

The countertops must be removed during the remediation to gain access to the drywall. P1.2005-0342 (Virtexco Quote for Morgan house. All other quotes are the same on this issue.), Trial Transcript at 2/19 Vol. I p. 82 (11-15) (Phillips Testimony). The contractors providing estimates for the Virginia homes indicate from experience that the countertops will chip or break during removal. P1.2005-0342 (Virtexco Quote for Morgan house. All other quotes are the same on this issue.). Beazer testified that the countertops in Florida homes being remediated broke during removal. Trial Transcript at 2/19 Vol. I p. 84 (9-15) (Phillips Testimony). Because of these factors, the countertops should be replaced as part of the remediation. P1.2005-0342 (Virtexco Quote for Morgan house. All other quotes are the same on this issue.); Trial Transcript at 2/19 Vol. I pp. 83 (21-25) - 84 (1-19) (Phillips Testimony).

*c. Trim, Crown Molding and Baseboards Must be Replaced*

Trim, crown molding and baseboards are placed on top of the drywall. P1.2016 (SGC Original Report), Trial Transcript at 2/19 Vol.I p.87 (2-6)(Phillips Testimony). They will have to be removed to get to the defective drywall. *Id.* In most instances it is less costly to replace these items than to take additional time to gently remove, store and put back the original materials. *Id.* This is the case with the representative homes. *Id.* Accordingly, the Court finds that these items should be replaced.

*d. Bathroom Fixtures Must be Replaced*

Sinks, toilets and shower enclosures generally must be removed when the drywall is removed because they are installed on top of drywall or to enable the remediation workers to move freely. It is more cost-effective to replaced these items than to gently remove, safely transport and store, and reinstall at a later date. P1.2050-0003 (Summaries of Cost Estimates); Trial Transcript at 2/19 Vol.I p. 82(11)-p.83(1), p.84(20-24). Thus these items should be removed and replaced.

**8. Insulation Must be Replaced**

The insulation cannot be adequately protected during the remediation process. P1.2058-001 (Wright Scope of Remediation). The insulation will be damaged during the removal of the drywall. P1.2058-001 (Wright Scope of Remediation), Trial Transcript at 2/19 Vol. I p. 78 (15-17) (Phillips Testimony), Trial Transcript at 2/22 Vol. II p. 93 (5-7) (Wright Testimony). It will also be contaminated with drywall dust produced during the removal of the drywall. P1.2058-001 (Wright Scope of Remediation), Trial Transcript at 2/19 Vol. I p. 78 (12-14) (Phillips Testimony), Trial Transcript at 2/22 Vol. II p. 93 (1-3) (Wright Testimony). The drywall dust cannot be properly cleaned or removed from the insulation. P1.2058-001

(Wright Scope of Remediation), P1.2027-0023 (Wright original Report), P1.2016-0088 (SGH Original Report), Trial Transcript at 2/19 Vol.I p. 78 (12-25) (Phillips Testimony), P1-1803-0013, 0036 and 0012 (Photos of debris and dust in insulation fibers after CDW removal from a Beazer home). It is more cost-effective to replace the insulation. P1.2058-001 (Wright Scope of Remediation), Trial Transcript at 2/19 Vol. I p. 78 (19-23) (Phillips Testimony).

**9. The Plaintiff-intervenor Homes Will Need to be Cleaned With a HEPA Vacuum, Wet-wiped or Power-washed, & Allowed to Air-out After Remediation**

In order to eliminate the tremendous amount of dust produced from removal of the drywall, and to eliminate the offensive odor of the Chinese drywall, Plaintiff-intervenors' homes will need to be cleaned and aired-out after remediation is complete. A HEPA vacuum should be used to remove the fine drywall dust and other particles. Additionally, the homes should be wet-wiped or power washed to eradicate any remaining particles. Finally, the houses will need to air out for between fifteen (15) and thirty (30) days. P1.2006-0083 (Bailey Original Report), P1.2009-0067 (Debbas Original Report), Deposition of Ronald Bailey (2/2/10) at 304 (21-24). The cleaning and airing-out is necessary to insure that all sulfur odors are gone. P1.2006-0083 (Bailey Original Report), P1.2016-0087 (SGH Original Report), Trial Transcript at 2/19 Vol. II p. 34 (11-15) (Smith Testimony).

**10. After Remediation, an Independent, Qualified Engineering Company Should Certify that the Homes are Safe for Occupation**

Following the deconstructing phase of the remediation process, the houses will need to be inspected by an independent and qualified engineering company. P1.2016-0084 (SGH Original Report), Trial Transcript at 2/22 Vol. II pp. 123 (24) - 124 (7) (Wright Testimony). This is important for insurance, resale potential, and peace of mind for the present occupants. The

independent and qualified engineering company should provide a letter or report indicating that the remediation has been correctly performed. P1.2016-0084 (SGH Original Report), Trial Transcript at 2/19 Vol. I p. 80 (11-14) (Phillips Testimony). The company should also provide a letter or report indicating that the homes are safe to be reoccupied. P1.2016-0084 (SGH Original Report), Trial Transcript at 2/22 Vol. II p.123 (24) - p.124 (7) (Wright Testimony).

**11. The Scope of Work is Consistent With Chinese Drywall Remediation by National Homebuilders**

The necessary remediation proposed by the PSC is essentially the same in all material respects as the scope of remediation being utilized by national builders Beazer Homes and Lennar Homes. Compare P1.2058-0001 (Wright Scope of Remediation) with P1.1888-0003 (Beazer Scope of Work) with P1.2016-0105 (Lennar Scope of Work), Trial Transcript at 2/22 Vol. I p. 99 (16-22) (Rutila Testimony). National builders Beazer and Lennar have also independently assessed the need for their remediation through scientific evidence, practical cost considerations, and hands-on experience with the problem. Trial Transcript at 2/19 Vol. I p. 69 (3-8), p.77 (4) - p.84 (24) (Phillips Testimony). Although in theory, a thorough cleaning or selective replacement of contaminated drywall may be an option, in practice however, the evidence however does not support the feasibility of such an option. The alternative remedies to a complete remediation that have been tried or suggested, such as selective identification and removal of Chinese Drywall, "cleaning" corroded wires, switches, and contact points, leaving corroded wires and switches in place, clipping the exposed ends of the corroded wires and splicing wires, or making new junction boxes, will not make the plaintiff whole, will not be adequate from a scientific or practical standpoint, and will not provide safety and marketability to the homeowner. P3.0544-0068-0070 (Acks Report) Trial Transcript at 2/19 Vol. I p. 75 (10-25)

(selective removal of CDW impossible) (Phillips Testimony), Trial Transcript at 2/22 Vol. I p. 125 (2-17) (impossible to reverse damage to wires by cleaning) (Rutila Testimony), Trial Transcript at 2/19 Vol. I p. 80 (6-10, 15-22) (leaving wires in place, clipping and splicing through junction boxes not to code and impossible to certify as safe) (Phillips Testimony). The impractical and time-consuming prospect of clipping, stripping and/or cleaning separate wires in a switch or junction box is demonstrated by reference to the sample switch box removed by Beazer's Jerry Smith from one of the Beazer homes. P1.1981 (sample switch box with wiring taken from Beazer home). The only economically feasible option, at least at the present time, is to totally gut the structure, take it down to the studs and remove and replace all wiring.

## **12. The Court's Scope of Remediation as Compared to the NAHB & CPSC Remediation Protocols**

After the hearing in the *Germano* matter, the National Association of Home Builders (NAHB) and the Consumer Product Safety Commission (CPSC), each released their own remediation protocols. In its protocol, the NAHB recommends taking out all drywall in a home unless the Chinese drywall is in a contained area. Rebecca Mowbray, *Chinese Drywall Guidance Offered by National Association of Home Builders*, The Times-Picayune, March 18, 2010, [http://www.nola.com/business/index.ssf/2010/03/chinese\\_drywall\\_guidance\\_offer.html](http://www.nola.com/business/index.ssf/2010/03/chinese_drywall_guidance_offer.html). It also recommends taking out all plumbing, low-voltage wiring, and carpet. *Id.* Further, the NAHB recommends the use of HEPA-filter vacuums to suck up dust, airing out homes over a period of time, and paying for temporary living expenses for displaced families. *Id.* These recommendations are consistent with the Court's own findings.

However, in contrast to the Court, the NAHB recommends removing only the damaged ends of high-voltage wiring, but advises builders who are concerned about meeting building

codes or being cost-effective to take all wiring out. *Id.* It also provides that tile floors, cabinets, and doors do not need to be replaced, unless it is more expensive to do so. *Id.* After hearing considerable evidence in the crucible of a judicial hearing, the Court is convinced that at least with regard to the representative cases this is not feasible or economically realistic.

The CPSC remediation protocol is largely consistent with the Court's protocol. Both call for the replacement of all possible problem drywall, all fire safety alarm devices, all electrical components and wiring, and all gas service piping and fire suppression sprinkler systems. *Interim Remediation Guidance for Homes with Corrosion from Problem Drywall*, Consumer Product Safety Commission & Department of Housing and Urban Development, April 2, 2010. However, if a portion of drywall can be reasonably identified as non-problematic drywall, the CPSC allows for leaving that drywall in place. *Id.*

The evidence reviewed by this Court indicates that the better and more realistic approach dictates the removal of all drywall in those homes in which there is a substantial mixture. This is necessary in order to remove and replace wires, pipes, and insulation, and to adequately clean the home. Furthermore, the evidence indicates that it is virtually impossible to detect with reasonable accuracy which is and which is not Chinese drywall.

**13. The Plaintiff-Intervenor Families will be Out of Their Homes for 4-6 Months During Remediation**

The evidence indicates that with regard to the representative homes, the remediation process will require the removal and demolition of most interior building components in the homes. P1.2058 (Wright's Scope of Remediation), Trial Transcript at 2/22 Vol. II p. 91 (6-16) (Wright Testimony). Accordingly, the families will need to move out of their homes during the remediation. Trial Transcript at 2/19 Vol. I p. 72 (24-25) (Phillips Testimony). The contractors

providing independent estimates to perform the remediation estimate that the process will take four (4) to six (6) months to complete. P1.2050-0003 (Summaries of Cost Estimates), Trial Transcript at 2/19 Vol. I p. 73 (5-6) (Phillips Testimony), Trial Transcript at 2/22 Vol. II p. 95 (25) - p. 26 (6) (Wright Testimony). The families are entitled to alternate living expenses during the remediation process. Trial Transcript at 2/19 Vol. I p. 72 (22-24), p. 73 (8-10) (Phillips Testimony).

**F. THE COSTS OF REPAIRING VIRGINIA CDW HOMES IS ON AVERAGE \$86/SQUARE FOOT**

The evidence supports the conclusion that the average cost per square foot to repair the *Germano* homes is \$86. P1.20509-0001 (Remediation Estimate Averages), Trial Testimony at 2/22 Vol. II p. 120 (12-14) (Wright Testimony). The average cost is the average of independent quotes from two local reputable Virginia contractors. P1.2050-0003 (Summaries of Cost Estimates), Trial Testimony at 2/22, Vol. II p. 117 (14-20) (Wright Testimony). Each contractor was provided a defined scope of work for the homes. P1.2027-0130 (Portion of Contractor Scope), Trial Testimony at 2/22, Vol. II p. 104 (8-11) (Wright Testimony). The defined scope of work for the homes is virtually identical to the *Beazer* scope of work. P1.1888-0003 (*Beazer* Scope of Work), Trial Testimony at 2/22 Vol. II p. 95 (11-13) (Wright Testimony). An independent quote was obtained from a smaller contractor that specializes in the remodeling and new construction of homes. P1.2050-0003 (Summaries of Cost Estimates), Trial Testimony at 2/22 Vol. II, p. 103 (9-13) (Wright Testimony). Additionally, an independent quote was obtained from a larger contractor that specializes in multi-family and commercial construction. P1.2005-0364 (Portion of *Virtexco* Estimate), Trial Testimony at 2/22 Vol. II p. 103 (20-23) (Wright Testimony).

The cost per square foot to repair includes the following:

1. Demolition and disposal of all damaged and affected building components in the homes. P1.2058-0001 (Wright's Scope of Remediation), P1.2050-0003 (Summaries of Cost Estimates), Trial Testimony at 2/22 Vol. II p. 93 (13-21) (Wright Testimony),
2. Replacement of all drywall. P1.2058-0001 (Wright's Scope of Remediation), Trial Testimony at 2/22 Vol. II, p. 70 (12-17) (Wright Testimony); *see also* P2.0239-0007 (Muller, Control of Corrosive Gases),
3. Replacement of the entire HVAC assembly. P1.2058-0001 (Wright's Scope of Remediation), Trial Testimony at 2/22 Vol. II p. 87 (13-16) (Wright Testimony).
4. Replacement of all electrical wiring and devices such as receptacles and switches. P1.2058-0001 (Wright's Scope of Remediation), Trial Testimony at 2/22 Vol. II p. 75 (11-16) (Wright Testimony).
5. Replacement of items that are damaged during the removal of the drywall, i.e., trim and baseboards. P1.2058-0001 (Wright's Scope of Remediation), Trial Testimony at 2/22 Vol. II p. 91 (6-16) (Wright Testimony).
6. Replacement of items that are less expensive to replace than store, i.e., carpet. P1.2058-0001 (Wright's Scope of Remediation), Trial Testimony at 2/22 Vol. II p. 92 (8-16) (Wright Testimony).

However, the cost per square foot to repair does not include the replacement of the exterior shell of the house, including windows, exterior doors, structural members, exterior siding, roof trusses, the roof, concrete, and nails. P1.2058-0001 (Wright's Scope of Remediation).

The average cost to repair complies with RS Means data. Trial Testimony at 2/22 Vol. II p. 116 (16-22) (Wright Testimony). RS Means is a publication which compiles data on a national basis for cost to repair and replace building components. P1.2027-0162 - 0165 (RS Means Data Excerpt, Trial Testimony at 2/22, Vol. II p. 112 (25), p. 113 (1-8) (Wright Testimony).

The average cost to repair the Plaintiff-intervenors' homes based upon the average cost to repair per square foot are as follows:

1. The average cost to repair the Morgan house is \$232,491. P1.2059-0001 (Remediation Estimate Averages), Trial Testimony at 2/22 Vol. II, p. 117 (22-24) (Wright Testimony).
2. The average cost to repair the Baldwin house is \$257,730. P1. 2059-001 (Remediation Estimate Averages), Trial Testimony at 2/22 Vol. II p. 117 (25), p. 118 (1) (Wright Testimony).
3. The average cost to repair the Orlando house is \$249,140. P1. 2059-001 (Remediation Estimate Averages), Trial Testimony at 2/22 Vol. II, p. 118 (2-3) (Wright Testimony).
4. The average cost to repair the Leach house is \$14,957. P1. 2059-001 (Remediation Estimate Averages), Trial Testimony at 2/22 Vol. II, p. 118 (4-5) (Wright Testimony).
5. The average cost to repair the Michaux house is \$198,142. P1.2059-001 (Remediation Estimate Averages), Trial Testimony at 2/22 Vol. II, p. 118 (6-7) (Wright Testimony).

6. The average cost to repair the McKellar house is \$194,720. P1.2059-001  
(Remediation Estimate Averages), Trial Testimony at 2/22 Vol. II p. 118 (8-9)  
(Wright Testimony).
7. The average cost to repair the Heischober house is \$312,755. P1.2059-001  
(Remediation Estimate Averages), Trial Testimony at 2/22 Vol. II p. 118 (10-11)  
(Wright Testimony).

**G. IT IS NOT CERTAIN THAT PLAINTIFF-INTERVENORS HAVE SUFFERED PROPERTY DEVALUATION CAUSED BY THE CHINESE DRYWALL CONTAMINATION**

There is testimony that the representative properties suffered a diminution in value because of the presence of the contaminated drywall. Trial Deposition of Kenneth Acks (2/2/10) at 10-28. Kenneth Acks is an expert in the field of estimating economic impacts of environmental hazards upon real estate. *Id.* Mr. Acks utilized reliable methodologies in reaching his conclusions with respect to the diminution in values of the seven properties as a result of the contaminated Chinese drywall. *Id.* Trial Deposition of Kenneth Acks (2/2/10) at p.60- p.72, p.80- p.82, p.84- p.102. According to Ack's testimony, the diminution in value of each of the seven properties as a result of the contaminated Chinese drywall, assuming that the property has been remediated or will be remediated with costs not borne by the property owner, is as follows:

- (1) 4020 Dunbarton Circle in Williamsburg - appraised value of \$382,000, diminution of 25% and a diminution value of \$95,500;
- (2) 4043 Dunbarton Circle in Williamsburg - appraised value of \$475,000, diminution of 10% and a diminution value of \$46,500;

- (3) 4091 Dunbarton Circle in Williamsburg - appraised value of \$381,000, diminution of 25% and a diminution value of \$95,250;
- (4) 8495 Ashington Way in Williamsburg - appraised value of \$382,000, diminution of 25% and a diminution value of \$95,500;
- (5) 1008 Hollymeade Circle in Newport News - appraised value of \$230,000, diminution of 20% and a diminution value of \$46,000;
- (6) 901 Eastfield Lane in Newport News - appraised value of \$267,500, a diminution value of 20% and a diminution value of \$53,500; and
- (7) 214 A 80th Street in Virginia Beach, appraised value of \$635,000, diminution of 30% and a diminution value of \$190,500. P3.0563-0001 (Table with the descriptions of the seven properties, the assessed values, and the appraised values as of August 31, 2008) and P3.0569-0001 (Table with the diminution in values of the seven properties) Trial Deposition of Kenneth Acks (2/2/10) at p.46- p.48, p.106- p.109.

Assuming that these properties are unremediated, according to Ack's testimony, the value of each of the seven homes as a result of the contaminated Chinese drywall decreases by an additional 5%, except for 4043 Dunbarton Circle which remains at a diminution value of 10%, plus the costs of the remediation. Trial Deposition of Kenneth Acks (2/2/10) at p.112- p.113.

Although diminution in value is a recognized item of damages under Virginia law, *see Averett v. Shircliff*, 218 Va. 202, 208, 237 S.E.2d 92, 95 (Va. 1977), the Court finds that at this point it is more speculative than actual. If the repairs are made properly there may be no diminution in value or at least it may be minimal. So this item of damage will not be allowed.

**H. CHINESE DRYWALL EFFECTS ON PLAINTIFF-INTERVENORS & THEIR HOMES, & THEIR RESULTING DAMAGES**

**1. The Plaintiff-intervenors Cases Provide a Representative Cross-section of Homes Contaminated by Chinese Drywall & Persons Harmed by Chinese Drywall**

The homes of the seven Plaintiff-intervenors are representative of a cross-section of contaminated homes, including single family homes, duplex construction, and townhomes.

P1.2016-0009 (Original SGH/Rutila Report) (The Court has accepted Mr. Rutila as an expert in multidisciplinary investigations of building and construction problems. Trial Transcript at 2/22 Vol.II, p.95 (22-25) (Rutila Testimony)), P3.0544-0003, 0010, 0011, 0012, 0013 (Acks Report) (Kenneth Acks, MBA was tendered as, and the Court accepted him as, an expert in property devaluation and environmental impacts on property value. Trial Deposition of Kenneth Acks (2/2/10) at 28). They include a range of values, type of construction, and amount of drywall. For example:

- a. The original costs of these homes reflect a broad cross-section ranging from that of a modest townhome to that of a higher-end custom home, including an elevator and custom floors and cabinetry throughout the home. P3.0544-0002 (Acks Report).
- b. The homes are representative of new home construction as well as of an additional alteration made to a home after initial construction. P1.2027-0007 (Original Report of Ron Wright) (The Court has accepted Mr. Wright as an expert in civil engineering. Trial Transcript at 2/22 Vol.II, p.65 (15-17) (Wright Testimony)).
- c. The use of drywall in the homes, based upon sales and delivery records, spans a spectrum from a small delivery of 8 boards to homes built with over 200 4'x12'

sheets of drywall. P1.2016-0017-0018 (Original SGH/Rutila Report).

The Court was presented evidence by both PSC and Knauf experts that the chemical and physical properties of Chinese-manufactured drywall (hereinafter “CDW” or “Chinese drywall”) do not differ significantly from region to region or state to state. P1.2025-0003, 0004 (Streit Supplemental Report) (Lori Streit, Ph.D. was tendered as, and the Court accepted her as, an expert in chemistry. Trial Deposition of Lori Streit (2/16/10) at p. 11(4)-p. p.14(17), P.2023-0015 – P2023-0020 (Original Streit Report, C.V.)), Deposition of Matthew Perricone (1/21/10) at Exhibit 2, p. i, ¶4.7, Deposition of Sandy Sharp (2/5/10) at p.148(15)–p.150(11), Trial Deposition of Lori Streit (2/16/10) at p.24(6)–p.25(1) (receiving different kinds of samples), p.26(11–12), p.27(21)–p.28(7) (finding commonalities among Chinese products) (finding samples from different sources to be similar).

These homeowners represent a broad cross-section demographically of families, ranging from families with young children to couples approaching retirement, with a broad cross-section of employments, including law enforcement, the military, the insurance industry, academia, religious ministry, and business management. Trial Transcript at 2/19 Vol.I pp. 49-61 (Morgan Testimony), Trial Transcript at 2/19 Vol. II pp.113-122 (McKellar Testimony), Trial Transcript at 2/22 Vol. I pp.4-14 (Michaux Testimony), Trial Transcript at 2/22 Vol.I pp. 78-87 (Heischober Testimony), Trial Transcript at 2/22 Vol. II pp.31-38 (Baldwin Testimony), Trial Transcript at 2/22 Vol.II pp.43-52 (Leach Testimony), Trial Transcript at 2/22 Vol.II pp.52-62 (Orlando Testimony). The economic disruption and hardship suffered by these families are found to be representative of the impact CDW has on homeowners. *Id.* Because of the wide spectrum encompassed by these representative structures, the general principles found applicable to them

will have relevance, if not in toto, at least partially, to all of the homes contaminated by defective Chinese drywall.

## **2. Law Applicable to Plaintiff-intervenors' Recovery of Damages**

The Court finds that Plaintiff-intervenors' interests in their real properties have been injured by defendant Taishan's negligence in producing a defective product, and that they are entitled to recover the damages proximately caused by same. The applicable law is the law of Virginia as the facts indicate that the real property of the Plaintiff-intervenors is situated in Virginia, and the losses which are the subject of this proceeding likewise occurred in Virginia. Additionally, no intervenor has disputed that Virginia law applies to the claims of the intervening homeowners against the defendant Taishan.

Plaintiff intervenors' negligence claims are not barred by Virginia's economic loss rule. *See Proto v. The Futura Group, LLC., et al.*, CL09-2455, Hearing Tr., Dec. 7, 2009 (Va. Cir. Ct.) at 68 (overruling demurrer with respect to negligence); *see also In re: Chinese Manufactured Drywall Prod. Liab. Litig.*, MDL 2047 (E.D. La., Jan. 13, 2010) (rejecting the arguments that the economic loss rule barred plaintiffs' tort claims); *In re: All Pending Chinese Drywall Cases*, CL 09-3105, *et al.*, at 5-10 (Va. Cir. Ct. March 29, 2010). In general, the measure of damages in Virginia for a negligence action is "the amount necessary to compensate the injured party for the damage proximately caused by the tortious conduct." *Lochaven Co. v. Master Pools by Schertle, Inc.*, 233 Va. 537, 591, 357 S.E.2d 534, 537 (Va. 1987). With respect to injury to real property, Virginia allows damages to be measured by diminished value, the cost of repair or a combination of both. "Both rules are merely evidentiary methods for determining that amount which will compensate the owner for his actual pecuniary loss sustained as a result of a negligent wrongful

act." *Averett v. Shircliff*, 218 Va. 202, 208, 237 S.E.2d 92, 95 (Va. 1977); *accord*, *St. Martin v. Mobil Exploration Producing U.S., Inc.*, No. 95-4128, 1998 U.S. Dist. LEXIS 12808, at \*28-29 (E.D. La. 1998) (property damages may include cost of restoration that has been reasonably incurred or the value of the property unless disproportionate); *McMinis v. Phillips*, 351 So.2d 1141 (Fla. App. 1977) (plaintiff may elect to recover reasonable cost of repairs).

Pursuant to Virginia law, the Plaintiff-intervenors' can recover both the cost of repair and the loss in value of their property after the repairs are completed. The evidence at trial established that for each of the properties at issue the damage is not permanent and is in fact repairable. Under these circumstances, the proper measure of damages is the cost of repair, plus the amount the property was depreciated, if any, because it was damaged. *Lee v. Bell*, 237 Va. 626, 379 S.E.2d 464 (Va. 1989) (cost of repair is proper measure of damages if evidence has been introduced showing repair costs); *Lochaven*, 233 Va. at 538, 357 S.E.2d at 543 (plaintiff entitled to recover all costs necessary to repair damage to embankment and pool deck caused by negligence of pool cleaning company); *Westlake Props. v. Westlake Pointe Prop. Owners Ass'n*, 273 Va. 107, 126, 639 S.E.2d 257, 269 (Va. 2007) (jury was properly instructed that measure of damages was reasonable cost of repairing or replacing the property, whichever is less, plus necessary expenses shown by the evidence to have been incurred by the plaintiff); *Wittman Family Trust v. Renaissance Housing Corp.*, 2000 Va. Cir. LEXIS 523 (Va. Cir., Nov. 30, 2000) (in case involving defective siding material (EIFS), court held that "the measure of compensatory damages is the cost of repair, unless the cost of repair would constitute economic waste."); Virginia Model Jury Instructions, Instruction No. 9.060 (Property Damage: Partial Loss) ("When personal property is partially damaged, the measure of damages is the reasonable cost of

repairing the property plus the amount, if any, the property was depreciated because it was damaged, plus the necessary and reasonable expenses shown by the evidence to have been incurred by the plaintiff as a result of the damage to the property.").

In addition to damage to real property, plaintiff intervenors' may recover damages to their personal property shown to be caused by the defective Taishan drywall. The measure of damages for injury to personal property in Virginia is similar to that for real property. Where personal property has been either destroyed or damaged "the general rule for determining the amount of damages for injury to personal property is the fair market value of the property before and immediately after the property was damaged, plus necessary reasonable expenses incurred by the owner in connection with the injury." *Averett*, 218 Va. at 206, 237 S.E.2d at 95 (Va. 1977). As with realty, the exception to the rule is where personal property has been damaged and can be restored by repairs. If the repairs would be less than the diminution in value because of the injury, the amount recoverable is the cost of repairs and the diminution in market value of the injured property, if any, after the repairs are made. *Averett*, 218 Va. at 206. Thus, if personal property has been destroyed, the measure of damages is market value plus any reasonable and necessary expenses incurred as a result of the injury. However, if the personal property has been damaged but not destroyed, the proper measure of damages is either (1) the diminution in market value plus reasonable and necessary expenses incurred or (2) the reasonable cost of repair plus a reasonable amount for lost value because of the injury, whichever is less.

Plaintiff-intervenors may recover damages to compensate for other losses caused by Taishan's defective drywall, including alternative living costs, costs associated with foreclosures and/or bankruptcy, additional amounts owed due to mortgage deferral, bankruptcy or inability to

refinance, and the loss of income. Under Virginia law, a plaintiff's recovery of damages includes all damages proximately caused by the tortious conduct. *Lochaven*, 233 Va. at 541, 357 S.E.2d at 537 ("The measure of damages in a negligence action is that amount necessary to compensate the injured party for the damages proximately caused by the tortious conduct."); *see also Packett v. Herbert*, 237 Va. 422, 377 S.E.2d 438 (Va. 1989) (damages to real property are not limited to the diminution in value and may include damages for loss in use and other consequential injuries); Restatement (Second) of Torts § 929 (1979) (providing that damages for injury to real property include compensation for loss of use of the property and other consequential injuries in addition to any permanent property damage, whether measured by restoration or market value); *Averett*, 218 Va. at 206, 237 S.E.2d at 95 (citing with approval Section 928 of the Restatement of the Law of Torts, which allows compensation for loss of use); *Seymour v. McDonald*, 24 Va. Cir. 531 (1981) (consequential damages recoverable in addition to damages for injury to real property); 5C Michie's Jurisprudence, Damages, § 32 (2006) (rule encompasses recovery of expenses incidental to irreparable injury); J. Costello, Virginia Remedies, Damages, § 21.04[2][a] (foreseeable consequential damages recoverable); *accord Bailey v. Missouri P.R. Co.*, 383 So. 2d 397, 402, 1980 La. App. LEXIS 3636 at \*15 (1980) (tortfeasor must compensate his victim "for even the most improbable severe consequences of his wrongful act.), citing, *Gallick v. B & O R.R.*, 83 S. Ct. 659 (U.S. 1963); *McMinis*, 351 So.2d at 1141 (relying on Section 928 of the Restatement of Torts). Damages for these consequential injuries are therefore all recoverable under Virginia law.

Plaintiff-intervenors are entitled to recover damages for loss of use and enjoyment of a residential property. This is supported by *Bowers v. Westvaco Corp.*, 419 S.E.2d 661, 668 (Va.

1992), where the Virginia Supreme Court held that a loss of use and enjoyment award of \$473,000 was not excessive where the defendant operated a 24/7 truck staging operation 20 feet from the plaintiff's driveway. Additionally, the New Hampshire Supreme Court upheld a \$360,000 loss of use and enjoyment award in a case where plaintiff's only loss was the loss of enjoyment in hiking and camping on his land after defendant cut down trees on the land. *Berliner v. Clukay*, 834 A.2d 297 (N.H. 2003). In *Hackney v. Courtland Homes*, 2006 WL 4394647 (Super. Ct. Ariz, 2006), a case arising from the construction of homes on expansive soils, the jury awarded each of the five homeowners compensation for the cost of repair, \$25,000 for diminished value, and \$40,800 for loss of use and enjoyment. In *Hardaway v. Arvida*, 1996 WL 33100325 (Ga. Super. 1996), a jury awarded the plaintiff homeowner \$25,000 for property damage and \$20,000 for loss of use and enjoyment in a case arising from damages caused by water runoff from an upstream subdivision. A jury awarded owners of a home located next to a cabinet manufacturer \$50,000 for loss of use in enjoyment in *Matuzsewski v. Imperial Cabinet*, 1990 WL 1084178 (Mich. Cir. Ct). In *Lyons v. Sparkle Plenty Car Wash*, 2002 WL 32138270 (Fla. Cir. Ct.), the jury awarded \$10,000 for loss of use and enjoyment to homeowners who bought their lots before construction of an adjacent carwash; and in *Pollack v. City of San Antonio*, 2003 WL 21695559 (Tex. Dist), the jury awarded the plaintiff, whose home was located adjacent to a negligently-maintained landfill, \$10,000 for loss of use and enjoyment. The loss of use and enjoyment suffered by the Virginia CDW plaintiff intervenors (including past and future displacement from the home, exposure to obnoxious gases, failures of electrical equipment, increase risk of electric failure and fire, and total loss of enjoyment of the home) is significant and more severe than several of the scenarios presented in the above-referenced jurisprudence.

In light of the above, to properly compensate the plaintiff intervenors for damages to their real property, the Court finds that the cost of repair shall include the cost of removing the source of corrosion from each home.

As discussed above, in order to make the Plaintiff-intervenors whole, they must be awarded a remedy which replaces all drywall, the electrical, electronic, and HVAC systems in the home, copper pipes in the home, and other copper and silver components in the home. The remedy also must provide a written guarantee to the owner from a certified environmental company that the home is free of contamination and damaged corroded components. Furthermore, in order to make the plaintiff intervenors whole, they must be awarded compensation for damaged personal property and other compensable damages as specified herein. The Court will now discuss this remediation protocol as it applies to the individual Plaintiff-intervenors' and their properties. In doing so, it will first provide detailed descriptions of each family and their circumstances arising from the Chinese drywall in their homes. The Court will then follow each description with a list of damages recoverable under the applicable law.

### **3. Plaintiff-intervenors & Their Damages**

#### *a. Deborah and William Morgan*

##### i. Background

Deborah and William Morgan own 8495 Ashington Way, Williamsburg, VA. P3.0419-0001- P3.0419-0003, P3.0398-0001 (Morgan deed, Morgan house photo), Trial Transcript at 2/19, Vol. I, p. 49 (25) - p.50 (5), (Morgan's Testimony). The Morgan home has 3,079 square feet. P1.2059-0001 (Remediation Estimate Averages). The Morgans have been

married 27 years, and have two daughters and a grandchild on the way. Trial Transcript at 2/19, Vol.I, p. 49 (17-24), (Morgan's Testimony). Bill Morgan retired from the Newport News police force as a master police detective after 24 years. He works now as a security manager for Camp Perry in Williamsburg. Trial Transcript at 2/19, Vol.I, p.50 (11) - p.51 (2), (Morgan's Testimony). Deborah teaches teachers as an instructional coach for the Newport News public school system. She was named teacher of the year for 3 years during her career. Trial Transcript at 2/19, Vol.I, p.51 (3-9), (Morgan's Testimony).

The Morgans purchased their home on July 14, 2006, for \$383,199.89. P3.0419-0001-P3.0419-0003 (Morgan deed), Trial Transcript at 2/19, Vol. I, p.51 (10-13), (Morgan's Testimony), P3.0637-0011- P3.0637-0012 (Tuthill's Supplemental Exhibit Morgan-1 (Revised for Trial Testimony) (The PSC tenders Ms. Tuthill, and the Court accepts her, as an expert in financial accounting and analysis. Trial Deposition of J.C. Tuthill (2/4/10) at p.19- p.24)). For a 2007 refinance, the home was appraised for \$470,000.00. P3.0419-0001- P3.0419-0003, P3.0426-0001 - P3.0426-18 (Morgan Refinance Appraisal April 2007).

The Morgans chose to move inland to higher ground to avoid flooding. Trial Transcript at 2/19, Vol. I, p.52 (12-16), (Morgan's Testimony). Bill and Deborah developed a strong attachment to 8495 Ashington Way the first time they saw it. While it was under construction they would drive to see it 2-3 times per week. Mr. Morgan would climb through the windows to look at it. It was their dream home. Trial Transcript at 2/19, Vol. I, p.52 (17) - p.53 (1), (Morgan's Testimony). The house was two stories. The entire rear of the house is basically one room. The dining room opens to the kitchen, the kitchen into the family room. Trial Transcript at 2/19, Vol.I, p.53 (5-13), (Morgan's Testimony).

The Morgans moved in on July 13 or 14, 2006. Trial Transcript at 2/19, Vol.I, p.54 (17-21), (Morgan's Testimony). They moved out of the home on June 23, 2009, having lived there just one month short of 3 years. P3.0407-0001- P3.0407-0014 (Lease), Trial Transcript at 2/19, Vol.I, p.55 (1-6), p.58 (1-5), (Morgan's Testimony). The Morgans complained that the house had a rotten chemical smell while the Morgans lived there. Trial Transcript at 2/19, Vol.I, p.53 (23) - p.54 (7), (Morgan's Testimony). Mrs. Morgan noticed the odor from the first day that they moved into the house; Mr. Morgan noticed it when they would leave for the weekend and then return. *Id.* The hot water heater of the Morgan home failed in the summer or fall of 2008, only two years after they moved in. Trial Transcript at 2/19, Vol.I, p.54 (7-12), p.54 (22-25), (Morgan's Testimony). Initially the electronic control box for it was replaced, but that remedy didn't work and the entire hot water heater was replaced. *Id.* After the water heater failed, one of their upstairs outlets failed, which tripped a circuit breaker. Trial Transcript at 2/19, Vol. I, p.55 (7-13), (Morgan's Testimony). Then two separate outlets in different rooms upstairs failed, but those failures did not trip the circuit breaker. *Id.* There was also an electrical short in the Morgans' HVAC system which caused a burning smell. Trial Transcript at 2/19, Vol. I, p.55 (7-25), (Morgan's Testimony). When the system was turned off awhile, the burning smell stopped; but when it was turned back on, the smell returned. *Id.* The Morgans slept through the night without heat. Mr. Morgan called an HVAC repair service, which advised that the short happened because a nut holding wires together had been burned through; but the repairman could not explain why that happened after testing the system. *Id.* The Morgans arranged for a more experienced company to inspect the HVAC system. *Id.* The inspector noticed a leak in the system, following which it was necessary to replace the HVAC coils in March or April 2009.

P3.0433-0001 - P3.0437-0001 (Morgan HVAC Repair Receipts), Trial Transcript at 2/19, Vol.I, p.56 (2-16), (Morgan's Testimony).

Due to their concern for fire safety following these developments, the Morgans bought two fire extinguishers for their home. P3.0430001- P3.0430-0002 (Morgan Fire Extinguisher Receipts), Trial Transcript at 2/19, Vol. I, p.56 (17-25), (Morgan's Testimony). Still, Mr. Morgan worried when he and his wife went to sleep that the house might catch fire, since the outlets had failed without tripping the circuit breakers. *Id.* In addition, the Morgans' smoke detector stopped working a year ago, as did a couple of computers, and a TV. Trial Transcript at 2/19, Vol.I, p.58 (6-14), (Morgan's Testimony). The control panel for the security system had to be replaced. *Id.* Counsel sent the Morgan's TV for laboratory analysis and the TV circuitry was found to be corroded. Trial Transcript at 2/19, Vol. I, p.58 (17-24), (Morgan's Testimony).

Mr. Morgan initially was reluctant to believe his home had CDW. Trial Transcript at 2/19, Vol. I, p.57 (13-14), (Morgan's Testimony). Mr. Morgan eventually found a "Venture Supply" label on the CDW in his attic. Trial Transcript at 2/19, Vol. I, p.57 (18-23), (Morgan's Testimony). The Venture label was discovered in March or April 2009, and the Morgans moved out on June 23, 2009. Trial Transcript at 2/19, Vol. I, p.58 (1-5), (Morgan's Testimony).

After the Morgans left their home, they moved into a rental home for which they pay \$1,900 per month. P3.0409-0001, P3.0407-0001-P3.0404-0014 (Morgan Chapter 13 Receipt, Morgan Lease), Trial Transcript at 2/19, Vol. I, p.59 (4-13), (Morgan's Testimony). They could not also afford to pay their mortgage of \$2,835 per month, so they filed for bankruptcy protection. *Id.* Filing for bankruptcy was made necessary because the Morgans could not afford their mortgage payments. Trial Transcript at 2/19, Vol I, p.59 (14-15); p.59 (16-25), (Morgan's

Testimony). Both Mr. Morgan and his elder daughter are cancer survivors, and the Morgans' younger daughter still lived with them at 8495 Ashington Way. The family was unwilling to endure further exposure to Chinese drywall. Trial Transcript at 2/19, Vol. I, p.59 (25) - p.60 (3), (Morgan's Testimony). Mr. Morgan was credible in his testimony as to the difficulty of missing mortgage payments. Trial Transcript at 2/19, Vol. I, p.60 (4-7), (Morgan's Testimony). The Morgans are still in bankruptcy. They paid out-of-pocket costs for their bankruptcy filing as well as attorney's fees. P3.0409-0001 (Morgan Chapter 13 Receipt), Trial Transcript at 2/19, Vol.I, p.60 (8-12), (Morgan's Testimony), Trial Transcript at 2/19, Vol.I, p.60 (4-7), (Morgan's Testimony). The Morgans have received a letter from the bankruptcy trustee to the effect that the mortgage company will be allowed to foreclose on their home; and this probably will occur in the near future, unless the company decides it does not want the property. Trial Transcript at 2/19, Vol.I, p.60 (13-18), (Morgan's Testimony).

Mr. Morgan has spent a significant amount of time allowing access to his home for testing and inspection, and gathering receipts for all of his expenses. Experts have reviewed all of his damaged possessions in order to obtain estimates on costs. He also worked with a CPA in New Orleans to prepare a summary of economic losses. The summary is a fair and accurate statement reflecting his economic damages. Trial Transcript at 2/19, Vol.I, p.60 (21) - p.61 (20), (Morgan's Testimony).

ii. Damages

The average cost of remediation of the Morgan home is \$232,491. P1.2059-0001, P3.0637-0011-P3.0637-0012 (Remediation Estimate Averages, Tuthill's Supplemental Exhibit Morgan-1 (Revised for Trial Testimony)).

The loss of the Morgan's personal property is \$886. P3.0546-0001- P3.0546-0039, P3.0637-0011-P3.0637-0012 (David Maloney's expert report (David J. Maloney is a Certified Member of the International Society of Appraisers (ISA) , and the PSC requests that the Court accept his expert opinions in the discipline of personal property appraisal. P3.0545-0009) (Maloney C.V.)), Tuthill's Supplemental Exhibit Morgan-1 (Revised for Trial Testimony)).

The past and future repair costs for the Morgans, including the Home Environmental Inspection post-remediation, is \$13,876.29. P3.0637-0011-P3.0637-0012 (Tuthill's Supplemental Exhibit Morgan-1 (Revised for Trial Testimony)).

The economic losses associated with the Morgan's foreclosure and bankruptcy are \$120,080. P3.0637-0011-P3.0637-0012 (Tuthill's Supplemental Exhibit Morgan-1 (Revised for Trial Testimony)), Deposition of J.C. Tuthill (2/4/10) p.95- p.103.

The alternative living costs recurring on a monthly basis during remediation to their home are \$2380 per month. Assuming the remediation will take six months, the total recurring monthly costs are \$14,280.

The Morgans have suffered the loss of use and enjoyment of their home and personal property. Repeated electronic failures and the real possibility of electrical fires, coupled with concerns for their family's health, forced the Morgans to abandon their home, to put the home into foreclosure and to file for bankruptcy. The Morgans moved out of the house on June 23, 2009 and will never return. Trial Transcript at 2/19, Vol.I, p. 49 (17)- p. 61 (25) (Morgan's Testimony), P3.0546-0001 - P3.0546-0039 (Expert report of David Maloney), P3.0637-0011-P3.0637-0012 (Tuthill's Supplemental Exhibit Morgan-1 (Revised for Trial Testimony)).

Assuming remediation is complete within six months, the total of damages proven by the Morgans is \$381,613.29, plus an award for loss of use and enjoyment of the home to be determined by the Court. P3.0637-0011-P3.0637-0012 (Tuthill's Supplemental Exhibit Morgan-1 (Revised for Trial Testimony)).

*b. Jerry and Inez Baldwin*

i. Background

Jerry and Inez Baldwin bought their single-family home with Chinese drywall at 4020 Dunbarton Circle in Williamsburg, Virginia, on November 21, 2006, for \$376,719.15. P3.0179-0001 (Baldwin Deed), Trial Transcript at 2/22, Vol.II, p.31 (13-20) (Baldwin's Testimony). They lived in the Atlanta area when Mr. Baldwin accepted a new position with his employer in Newport News, VA. Trial Transcript at 2/22, Vol.II, p.32 (15-19) (Baldwin's Testimony). The Baldwins selected this newly-constructed home at the time when Mrs. Baldwin's mother was living with them, they needed a house with a full bathroom and bedroom on the first floor for her convenience. Trial Transcript at 2/22, Vol.II, p.32 (20) - p.33 (7) (Baldwin's Testimony). The Baldwin residence has 2,957 square feet. P1.2059-0001 (Wright's Remediation Estimate Averages). The Baldwins' down payment was \$100,000, and they also paid for \$12,000 in upgrades. The Baldwins made this down payment in order to reduce their mortgage payments. Trial Transcript at 2/22, Vol.II, p.33 (8-17) (Baldwin's Testimony). The move-in date was late November 2006. Trial Transcript at 2/22, Vol.II, p.32 (9-10) (Baldwin's Testimony).

Jerry and Inez Baldwin still live in the house at 4020 Dunbarton Circle because they cannot afford to move out and make both pay mortgage and rent payments. Trial Transcript at

2/22, Vol.II, p.32 (11-14) (Baldwin's Testimony). Mr. Baldwin worries about the health of his family, including his 33-year old son and grandchildren when they visit. Trial Transcript at 2/22, Vol.II, p.38 (12-16) (Baldwin's Testimony).

The Baldwin house has Chinese drywall from Venture Supply. P3.0200-0001 (Venture Supply Invoice), Trial Transcript at 2/22, Vol.II, p.34 (23-25) (Baldwin's Testimony).

The Baldwins have experienced numerous electrical failures in their home. They are on a third set of HVAC coils in the garage (the previous two having failed). Their microwave and refrigerator failed; and their thermostat failed. P3.0207-0001- P3.0211-0001, P3.0212-0001, P3.0215-0001, P3.0204-0001, P3.0205-0001, P3.0206-0001 (HVAC Repairs, Microwave repairs, Refrigerator repairs), Trial Transcript at 2/22, Vol.II, p.32 (1-10) (Baldwin's Testimony). Two computers in the Baldwin home also have failed. These were located in the office on the first floor, what would have been Mrs. Baldwin's mother's bedroom. P3.0204-0001, P3.0205-0001, P3.0206-0001 (Computer repair & replacement), Trial Transcript at 2/22, Vol.II, p.32 (1-10), p.33 (18-24) (Baldwin's Testimony). When the computers failed, the Baldwin family lost personal photography, recipes, and documents. They had not backed up the computer and the data was irretrievable. Trial Transcript at 2/22, Vol.II, p.35 (3-8) (Baldwin's Testimony). This irreplaceable personal property had unique and significant value for these Plaintiffs.

Knauf's experts tested the ceiling in the first floor office, and reported that the drywall was domestic and not Chinese. Mr. Rutila (plaintiffs' expert) drilled core samples and tested them in a lab; he concluded that the drywall was indeed Chinese and was releasing corrosive gases. Trial Transcript at 2/22, Vol.II, p.34 (8) - p.35 (2) (Baldwin's Testimony). However, Mr. and Mrs. Baldwin wish to remediate their whole house, both floors, because they have had

failures on both floors. Trial Transcript at 2/22, Vol.II, p.35 (17-18) (Baldwin's Testimony). For example, the coils on their second floor air handler are black, and the Baldwins have been told that they need to be replaced. Trial Transcript at 2/22, Vol.II, p.35 (9-18) (Baldwin's Testimony). Additionally, the lamp brought into the courtroom was also in the first floor office. (The lamp was discussed by Mr. Rutilla as having corrosion in its cord.) Trial Transcript at 2/22, Vol.II, p.33 (23) - p.34 (4) (Baldwin's Testimony).

When the home is remediated, the Baldwins will have to move out of the house, which will represent a hardship for them. Trial Transcript at 2/22, Vol.II, p.35 (19-22) (Baldwin's Testimony).

The Baldwin's mortgage lender offered a forbearance of payments for three months. Trial Transcript at 2/22, Vol.II, p.35 (23) - p.36 (25) (Baldwin's Testimony). The interest would accrue and would be due at the end of the 3 months. *Id.* The lender was willing to discuss extending the forbearance at the end of the 3 months. *Id.* The Baldwins declined. *Id.* Jerry and Inez Baldwin have tried to refinance their mortgage loan to take advantage of lower interest rates, but they were unable to find a lender which would loan money for a Chinese drywall home. Trial Transcript at 2/22, Vol.II, p.37 (1-12) (Baldwin's Testimony). Jerry Baldwin is 59 and had hoped to retire in 6 years to collect a higher social security payment. However, the home in Williamsburg represents a major portion of his financial assets. If the bank forecloses and the \$265,000 mortgage balance becomes due, this would deplete virtually all of this family's savings. Trial Transcript at 2/22, Vol.II, p.37 (13) - p.38 (6) (Baldwin's Testimony). Mr. and Mrs. Baldwin have been diligent in saving and planning for retirement; but the economic consequences of the events associated with CDW have had a devastating impact on their lives.

Trial Transcript at 2/22, Vol.II, p.38 (19-25) (Baldwin's Testimony).

Mr. and Mrs. Baldwin worked with counsel and a forensic accountant (J.C. Tuthill) to verify that the summary exhibit attached to the Tuthill report is an accurate statement of the financial damages these plaintiffs have suffered. P3.0637-0001- P3.0637-0002 (Tuthill's Supplemental Exhibit Baldwin-1 (Revised for Trial Testimony)).

ii. Damages

The cost of remediation of the Baldwin home is \$257,730.00. P1.2059-0001 (Wright's Remediation Estimate Averages), P3.0637-0001- P3.0637-0002 (Tuthill's Supplemental Exhibit Baldwin-1 (Revised for Trial Testimony)).

The remediation of the Baldwin home should take between 4 and 6 months.

The future alternative living costs, non-recurring, for the Baldwins is \$7,895.43. P3.0637-0001- P3.0637-0002 (Tuthill's Supplemental Exhibit Baldwin-1 (Revised for Trial Testimony)).

The alternative living costs recurring on a monthly basis post-trial until the remediation is done are \$4,844.98. P3.0637-0001- P3.0637-0002 (Tuthill's Supplemental Exhibit Baldwin-1 (Revised for Trial Testimony)). Assuming the remediation of their home is going to take six months, the total recurring monthly costs are \$29,069.88.

The loss of personal property of the Baldwins is \$2,075.00. P3.0546-0001- P3.0546-0039 (Expert report of David Maloney), P3.0637-0001- P3.0637-0002 (Tuthill's Supplemental Exhibit Baldwin-1 (Revised for Trial Testimony)).

The cost for repairs of the Baldwin property, both past and future, including the Home Environmental Inspection post-remediation, is \$17,769.80. P3.0637-0001- P3.0637-0002

(Tuthill's Supplemental Exhibit Baldwin-1 (Revised for Trial Testimony)).

The Baldwins have suffered the loss of use and enjoyment of their home. Jerry and Inez Baldwin worked during their 40 year marriage to build enough equity in their home which would enable them to retire in 7 years. They pride themselves in never missing a mortgage payment. They have lost that financial security their home provided. The Baldwins have also lost 2 computers (and the data thereon), a refrigerator, a microwave, and have suffered through more air conditioning problems in the 3 years they have been in the home than the average person experiences in their lifetime. P3.0546-0001- P3.0546-0039 (Expert report of David Maloney), P3.0637-0001- P3.0637-0002 (Tuthill's Supplemental Exhibit Baldwin-1 (Revised for Trial Testimony), Trial Transcript at 2/22, Vol.II, p.31 (12) - p.38 (25) (Baldwin's Testimony).

Assuming remediation is complete within six months of trial, the total of economic damages proved by the Baldwins is \$341,699.11 plus an award for loss of use and enjoyment of the home to be determined by the Court. P3.0637-0001- P3.0637-0002 (Tuthill's Supplemental Exhibit Baldwin-1 (Revised for Trial Testimony)).

*c. Joe and Cathy Leach*

*i. Background*

Joe and Cathy Leach purchased a single family home at 4043 Dunbarton Circle in Williamsburg, Virginia, on July 23, 2008, for \$475,000.00. P3.0295-0001- P3.0295-0003 (Leach Deed), Trial Transcript at 2/22, Vol.II, p.44 (4-11) (Leach's Testimony). The house is a ranch-style construction with a full basement. It is built in equal sizes on both levels, and features a bonus room above the garage. The main level is three bedrooms, dining and living rooms and kitchen; the downstairs has an office, an entertainment room and another full master

suite. Trial Transcript at 2/22, Vol.II, p.44(21) - p.45(2) (Leach's Testimony). The house is two levels on a hill. The basement is fully redone. Trial Transcript at 2/22, Vol.II, p.45 (3-10) (Leach's Testimony).

The previous owners added a wine room to the basement, which has the Chinese Drywall. Trial Transcript at 2/22, Vol.II, p.46 (19-25), p.44 (12-16) (Leach's Testimony). The wine room had been added by the previous owners to maximize space by finishing off the under part of the porch. It is 10 feet by 10 feet. Trial Transcript at 2/22, Vol.II, p.46 (9-18) (Leach's Testimony). The house only has 8 sheets of Chinese Drywall. Trial Transcript at 2/22, Vol.II, p.46 (19-25), p.44 (12-16) (Leach's Testimony). The wine room has no HVAC vents so the air doesn't circulate when the door is closed. They keep the door closed all the time. Trial Transcript at 2/22, Vol.II, p.51 (14-19), p.52 (1-6) (Leach's Testimony). The prior owners used a dehumidifier in the home's wine room, but the dehumidifier failed. Trial Transcript at 2/22, Vol.II, p.51 (21-25) (Leach's Testimony).

Cathy and Joe Leach currently live in the home with their two children, Joseph and Sarah. Trial Transcript at 2/22, Vol.II, p.45 (11-13) (Leach's Testimony). Mr. Leach is a military officer for the Department of Defense, working on special operations projects. He often is called to duty away from home. Trial Transcript at 2/22, Vol.II, p.43 (17-25), p. 48 (17-21) (Leach's Testimony). Cathy Leach's parents used to live in the full suite in the basement. When the family's young son Joseph went downstairs to visit his grandparents, he would get nosebleeds. Joseph was instructed not to go downstairs for two weeks; the nosebleeds stopped. Once, he went downstairs and the bleeds began. Trial Transcript at 2/22, Vol.II, p.45 (14) - p.46 (1) (Leach's Testimony). Cathy Leach's parents lived in the finished basement of the house, but

moved out because of the Chinese drywall and the respiratory symptoms the family linked to Chinese Drywall. Trial Transcript at 2/22, Vol 2, p.47(12) - p.48 (19-37) (Leach's Testimony). When Cathy Leach's parents moved out, this imposed a burden on the family because Mrs. Leach works during the day and Mr. Leach is out-of-town for his job. The loss of this prior support was disruptive for the family. Trial Transcript at 2/22, Vol.II, p.48 (14-21) (Leach's Testimony). Cathy Leach works outside the home for an insurance company in Richmond. When her parents moved out, she had to find day care and after school care for the children. They moved out so quickly that Mrs. Leach had to make hurried arrangements for the children. Trial Transcript at 2/22, Vol.II, p.49(2-9) (Leach's Testimony).

The Leach family lost about 2400 square feet of their home when they shut off the basement due to CDW. P3.0284-0001 (Leach Floor Plan), Trial Transcript at 2/22, Vol.II, p.48 (9-13) (Leach's Testimony). Chinese Drywall, even confined to one room in the Leach house, has greatly impacted this family. Trial Transcript at 2/22, Vol.II, p.49 (10-13) (Leach's Testimony).

Joe Leach wished to remediate the house himself, trying to arrange something with the builder. This plan did not work; the Chinese Drywall remains. Trial Transcript at 2/22, Vol.II, p.49 (14- 25) (Leach's Testimony). Mr. and Mrs. Leach recognize that CDW remediation will be a very extensive project, due to the need to run new electrical wires from the wine room to the electrical panel. Trial Transcript at 2/22, Vol.II, p.50 (1-9) (Leach's Testimony).

Cathy and Joe Leach tried to refinance their mortgage when interest rates dropped by 2 percentage points, but were unable to do so because of the presence of Chinese Drywall. The refinance would have saved them about \$600 per month. P3.0302-0001, P3.303-0001-

P3.303-0002 (Leach Refinance Denials), Trial Transcript at 2/22, Vol.II, p.50 (10-23) (Leach's Testimony).

Joe Leach has missed a couple of job opportunities due to the Chinese Drywall; he had to turn down two job offers because he would have to move out of Virginia, and it would not have been possible to sell this Chinese Drywall house quickly enough. Trial Transcript at 2/22, Vol. , p.50 (18) - p.51(1) (Leach's Testimony). The Chinese Drywall has had a significant impact on Mr. Leach's ability to earn a living for his family. Trial Transcript at 2/22, Vol.II, p.52 (2-5) (Leach's Testimony).

The odor in the room of the Leach home with Chinese drywall is very noticeable and strong. Trial Transcript at 2/22, Vol.II, p.52 (12-13) (Leach's Testimony). Mr. Leach described the smell as pungent, like swamp gas or a sewer- type odor. It was this odor which originally led the family to have the room inspected; they thought there was water damage in the area.

P3.0285-0001-P3.0285-0003 (Inspection Report); Trial Transcript at 2/22, Vol.II, p.52 (7-13) (Leach's Testimony).

Mr. and Mrs. Leach worked with counsel, the appraisers and a forensic accountant (J.C. Tuthill) to assure the summary exhibit attached to the latter's report was an accurate statement of financial damages. P3.0637-0005- P.3.0637-0006 (Tuthill's Supplemental Exhibit Leach-1 (Revised for Trial Testimony), Trial Transcript at 2/22, Vol.II, p.51 (6-11) (Leach's Testimony).

- ii. The Leach home is a unique example of known localized use of Chinese drywall which can be repaired as a stand-alone unit of the home, without removing all drywall in the home

The Leach home is an example of an extremely localized use of CDW in a single room added to the home after home construction was completed. P1.2016-0018, 0110 (Original

SGH/Rutila Report), Trial Transcript at 2/22, Vol.II, p.44(12-16), p.46(19-25), p.51(14-19), p.52(1-6), p.46(2-7), p.46(9-18) (Leach Testimony). The room was small, and was conceived by the original owner to be used as a wine room. P1.2016-0018, 0110 (Original SGH/Rutila Report), Trial Transcript at 2/22, Vol.II, p.44(12-16), p.46(19-25), p.51(14-19), p.52(1-6), p.46(2-7), p.46(9-18) (Leach Testimony). The plaintiffs purchased the home from the original owner, but the room had never been utilized for its intended purpose. *Id.* Because this small room was to be climate-controlled, there were no HVAC registers or returns for the HVAC system on the lower floor of the house where the room was added. P1.2016-0018, 0110 (Original SGH/Rutila Report), Trial Transcript at 2/22, Vol.II, p.44(12-16), p.46(19-25), p.51(14-19), p.52(1-6), p.46(2-7), p.46(9-18) (Leach Testimony). After careful investigation, the experts retained by the PSC concluded that no damage had been done to the mechanical systems of the Leach home due to the lack of air circulation to or from the room. P1.2016-0018, 0110 (Original SGH/Rutila Report), Trial Transcript at 2/22, Vol.II, p.44(12-16), p.46(19-25), p.51(14-19), p.52(1-6), p.46(2-7), p.46(9-18) (Leach Testimony). In the context of a small repair or addition such as this where the corrosive gases from CDW are isolated from the other portions of the home by physical and mechanical barriers, drywall removal only in such an area is feasible. P1.2016-0018, 0110 (Original SGH/Rutila Report), Trial Transcript at 2/22, Vol.II, p.44(12-16), p.46(19-25), p.51(14-19), p.52(1-6), p.46(2-7), p.46(9-18) (Leach Testimony). The Court finds, however, that the installation of even small numbers of Chinese drywall boards in a home requires extensive repairs and results in significant other consequential damages as set forth in the following.

iii. Damages

The cost of remediation of the Leach home is \$14,957.00. P1.2059-0001 (Wrights' Remediation Estimate Averages), P3.0637-0005- P.3.0637-0006 (Tuthill's Supplemental Exhibit Leach-1 (Revised for Trial Testimony)).

The loss of personal property of Joe and Cathy Leach is \$5,564.00. P3.0546-0001- P3.0546-0039 (Expert report of Dave Maloney), P3.0637-0005- P.3.0637-0006 (Tuthill's Supplemental Exhibit Leach-1 (Revised for Trial Testimony)).

The costs for repair of the Leach property, both past and future, including the Home Environmental Inspection post-remediation, is \$13,199.12. P3.0637-0005- P.3.0637-0006 (Tuthill's Supplemental Exhibit Leach-1 (Revised for Trial Testimony)).

The Leach's lost about \$600 per month due to their inability to refinance their mortgage because of the Chinese drywall in their home. Over twelve months, the Leach's additional costs due to their inability to refinance are \$7,200. P3.0637-0005- P.3.0637-0006 (Tuthill's Supplemental Exhibit Leach-1 (Revised for Trial Testimony)). This amount will be allowed, but to extend this amount into the future is too speculative.

The total monthly recurring economic damages for the Leach's is \$1,635.29 per month for March- August 2010. Assuming the remediation takes six months, the total monthly recurring economic damages are \$9,811.74. P3.0637-0005- P.3.0637-0006 (Tuthill's Supplemental Exhibit Leach-1 (Revised for Trial Testimony)).

Joe and Cathy Leach have suffered a loss of the use and enjoyment of their home and their personal property. When the Chinese Drywall was discovered in August 2009, their large home was essentially divided in half, one half being a basement. The basement of the house now is closed off due to the Chinese Drywall in the wine room. Mr. Leach bought a new computer

and moved his office upstairs. No one can use the elaborate entertainment system in the basement. P3.0546-0001 - P3.0546-0039 (Expert report of David Maloney), P3.0637-0005- P.3.0637-0006 (Tuthill's Supplemental Exhibit Leach-1 (Revised for Trial Testimony), Trial Transcript at 2/22, Vol.II, p.43 (17) - p.52 (13) (Leach's Testimony).

Assuming remediation is complete within six months of trial, the total of all economic damages proven by Joe and Cathy Leach is \$59,676.86, plus an award for loss of use and enjoyment of the home to be determined by the Court. P3.0637-0005- P.3.0637-0006 (Tuthill's Supplemental Exhibit Leach-1 (Revised for Trial Testimony).

*d. Robert and Lisa Orlando*

*i. Background*

Robert and Lisa Orlando purchased a single family home at 4091 Dunbarton Circle, Williamsburg, Virginia, for \$369,500 on June 4, 2009. P3.0500-0001- P3.0500-0003 (Orlando deed), P3.0637-0013- P3.0637-0014 (Supplemental Exhibit Orlando-1 (Revised for Trial testimony)), Trial Transcript at 2/22, Vol.II, p.53 (5-13) (Orlando's Testimony). The appraised value of the home at the time of the sale was \$372,000. P3.0519-0002 (Orlando appraisal for purchase). The Orlando residence has 3,245 square feet. P1.2059-0001. The Orlandos put down \$150,000 when they purchased the house. The money for the down payment was all the money they had saved. This \$200,000 investment was the biggest they had ever made. It was a little under 1/2 of the purchase price. P3.0521-0001- P3.0521-0002 (Settlement Statement), Trial Transcript at 2/22, Vol.II, p.55 (20-24), p.55 (1) - p.56 (7) (Orlando's Testimony). The Orlandos looked forward to the move because the home was to have an in-ground pool. Trial Transcript at 2/22, Vol.II, p.54 (16-23) (Orlando's Testimony). They paid \$50,000 for the in-ground pool. *Id.*

The Orlandos have three sons (twins who are 18 and one who is 13). The family moved down from upstate New York to Virginia when Mr. Orlando accepted a job in 2009. This was a significant move because the twins missed their senior year in high school in New York. Trial Transcript at 2/22, Vol.II, p.54 (1-3), p.54 (9-12) (Orlando's Testimony).

The Orlando house had 163 4x12 boards of Venture Supply drywall delivered to it. Trial Transcript at 2/22, Vol.II, p.53 (14-17) (Orlando's Testimony).

After living in the home for four weeks, having just finished the landscaping and the pool, the Orlandos received a letter from the builder saying that they may have 172 sheets of Chinese drywall. P3.0507-0001 (Orlando Letter from American Eastern dated 7/16/09), Trial Transcript at 2/22, Vol.II, p.55 (3-7) (Orlando's Testimony). The families in Mrs. Orlando's community who have Chinese Drywall have shared information with one another during the past months. Trial Transcript at 2/22, Vol.II, p.55 (16-19) (Orlando's Testimony). The Orlandos first noticed a smell when they toured the house; they thought it was from the previous owner's two children in diapers. After they moved in, the smell got progressively worse. Trial Transcript at 2/22, Vol.II, p.56 (8-19) (Orlando's Testimony). The Orlandos had all the carpets in the home cleaned, but the smell did not go away. P3-0523-0001 (Orlando carpet cleaning receipt), Trial Transcript at 2/22, Vol.II, p.56 (17-18) (Orlando's Testimony). Mrs. Orlando describes the odor as similar to the smell of spent fireworks. Trial Transcript at 2/22, Vol.II, p.56 (20-22) (Orlando's Testimony).

The Orlando's hot water heater failed. The previous owner told them that in three years the air conditioner went out 2 times. The Orlandos had problems with their HVAC unit the summer of 2009. The person who came to look at their HVAC unit in August 2009 showed them

the pits in the HVAC coils and could not believe that the coils were only a year old. He thought the unit was much older. P3.0524-0001 (Orlando email from Atlantic Constructors), Trial Transcript at 2/22, Vol.II, p.55 (25) - p.57 (9).

Mr. and Mrs. Orlando remained in the house 7 months. It was not a difficult decision to move out because they believed that, if Chinese Drywall caused pitting in metal that it also posed a risk to the family's young children's health. Trial Transcript at 2/22, Vol.II, p.57 (10-17) (Orlando's Testimony). For as long as they were in the house, Mr. and Mrs. Orlando believed there was more Chinese drywall upstairs than downstairs. They brought mattresses downstairs, and one son slept on a mattress on the floor in the study while the rest of the family slept in the master bedroom. Nathan Orlando, age 17, was embarrassed that he had to sleep in the same room as his parents. Trial Transcript at 2/22, Vol.II, p.57 (20) - p.58 (1), p.58 (4-10) (Orlando's Testimony). Mrs. Orlando put a curtain across the top of the stairs to try to trap the air and gases and smell upstairs. Trial Transcript at 2/22, Vol.II, p.58 (2-3) (Orlando's Testimony). The Orlando family was careful to figure out how to move out of this home and not jeopardize their credit. Trial Transcript at 2/22, Vol.II, p.57 (17-19) (Orlando's Testimony).

Having moved out of their CDW home, the Orlando family pays rent of \$2,000, higher than the home's mortgage payment of \$1,211.89. Still, they prefer to be out of the CDW house. P3.0637-0013- P.3.0637-0014 (Tuthill's Supplemental Exhibit Orlando-1 (Revised for Trial Testimony)), Trial Transcript at 2/22, Vol.II, p.58 (11-16) (Orlando's Testimony), P3.0506-0001- P3.0506-0005 (Lease).

Knauf experts reported that there was no Chinese Drywall in the ceilings of the bedroom or in two tested places in the living room of the Orlando house. Trial Transcript at 2/22, Vol.II,

p.58 (17-24) (Orlando's Testimony). The Orlandos thereafter allowed their counsel to remove the entire ceiling of the house; and, on the back of the removed drywall, there were markings of Venture Supply, i.e., Taishan. Trial Transcript at 2/22, Vol.II, p.59 (1-10) (Orlando's Testimony).

The Orlandos desire that their home be stripped to the studs with new drywall and with complete mechanical and electrical systems replaced. Trial Transcript at 2/22, Vol.II, 59:11-15 (Orlando's Testimony).

Mr. and Mrs. Orlando have worked with counsel, the appraisers and a forensic accountant (J.C. Tuthill) to assure the summary exhibit attached to the latter's report is an accurate statement of financial damages. P3.0637-0013- P.3.0637-0014 (Tuthill's Supplemental Exhibit Orlando-1 (Revised for Trial Testimony)), Trial Transcript at 2/22, Vol 2, p.59 (16-25) (Orlando's Testimony).

ii. Damages

The cost of remediation of the Orlando home is \$249,140. P1.2059-0001, P3.0637-0013- P3.0637-0014 (Remediation Estimate Averages, Tuthill's Supplemental Exhibit Orlando-1 (Revised for Trial Testimony)).

The remediation of the Orlando home should take between 4 and 6 months.

The alternative living costs, non-recurring, both past and future, for the Orlandos are \$16,656.23. P3.0637-0013- P.3.0637-0014 (Tuthill's Supplemental Exhibit Orlando-1 (Revised for Trial Testimony)), Trial Deposition of J.C. Tuthill (2/4/10) at p.31(110-112).

The alternative living costs recurring on a monthly basis post trial are \$2,368.92. P3.0637-0013- P.3.0637-0014 (Tuthill's Supplemental Exhibit Orlando-1 (Revised for Trial Testimony)), Trial Deposition of J.C. Tuthill (2/4/10) at p. 31(110-112). Assuming remediation

occurs within six months, the total recurring monthly living costs are \$14,213.52.

The loss of personal property of the Orlando belongings is \$2,375. P3.0546-0001-P3.0546-0039, P3.0637-0013- P.3.0637-0014 (Expert report of Dave Maloney, Tuthill's Supplemental Exhibit Orlando-1 (Revised for Trial Testimony)).

The repair costs of the Orlando property, both past and future, including the Home Environmental Inspection post-remediation, are \$14,426.09. P3.0637-0013- P.3.0637-0014 (Tuthill's Supplemental Exhibit Orlando-1 (Revised for Trial Testimony)).

The additional amounts owed by the Orlandos for mortgage deferral for 1 year are \$11,094.60. P3.0637-0013- P.3.0637-0014 (Tuthill's Supplemental Exhibit Orlando-1 (Revised for Trial Testimony), Trial Deposition of J.D. Tuthill (2/4/10) at p. 113(15)- p.115(15).

The Orlandos have suffered the loss of use and enjoyment of their home and personal property. Lisa and Bob Orlando and their sons lived in their home only 7 months moving out February 1, 2010. The move has cost them the use of their home. They essentially abandoned their second story as the majority of the Chinese Drywall is believed to be there. The family lived in one-half of the house for 7 months. Trial Transcript at 2/22, Vol.II, p. 53 (1)- p. 59 (25) (Orlando's Testimony), P3.0546-0001 - P3.0546-0039 (Expert report of David Maloney), P3.0637-0013- P.3.0637-0014 (Tuthill's Supplemental Exhibit Orlando-1 (Revised for Trial Testimony)).

Assuming remediation is complete within six months of trial, the total of all economic damages proven by the Orlando's is \$307,905.44 plus an award for loss of use and enjoyment of the home and personal property to be determined by the Court. P3.0637-0013- P.3.0637-0014 (Tuthill's Supplemental Exhibit Orlando-1 (Revised for Trial Testimony)).

e. *Fred and Vanessa Michaux*

i. Background

Fred and Vanessa Michaux purchased their townhouse with Chinese drywall at 901 Eastfield Lane, Newport News, VA, on November 1, 2007, for \$267,500. P3.0464-0001 (Michaux Deed) Trial Transcript at 2/22, Vol.I, p.4 (17-20), p.5 (1- 4) (Michaux Testimony). The Michaux residence has 2,367 square feet and is a 3 story townhome. P1.2059-0001 (Wright's Remediation Estimate Averages), P3.0443-0001 (Photo of townhome), Trial Transcript at 2/22, Vol.I, p.5 (12-25) (Michaux Testimony). On the first floor is Mr. Michaux's office, which is like a living room, a half bath, 2 car garage, and a laundry room; the second floor is the main living space with living room, half bath, dining room, great room, and TV room; the third floor has 3 bedrooms and 2 full baths. P3.0444-0001- P3.0444-0003 (Michaux floor plan), Trial Transcript at 2/22, Vol.I, p.5 (16-22) (Michaux Testimony). The down payment was \$40,000 which took the Michauxs 10 years to accrue. P3.0466-0001- P3.0466-0004 (Michaux Mortgage Documents), Trial Transcript at 2/22, Vol.I, p.13 (14-15) (Michaux Testimony).

Mr. Michaux is a pastor of the City Life Church in Newport News. Trial Transcript at 2/22, Vol.I, p.6 (20-23) (Michaux Testimony). They have three children: Derrick (9), Ethan (7) and Claire (5). Trial Transcript at 2/22, Vol.I, p. 6 (15-17) (Michaux Testimony). Mr. and Mrs. Michaux were attracted to this home because it provided space for their career activity. The couple offers marriage counseling, which they could provide in the privacy of the first floor. The second floor afforded space for hosting church meetings, which they conduct about twice a week. The Michaux children are home-schooled in the townhome. The Michaux family life, church life and school life were all accommodated within the townhome. Trial Transcript at 2/22,

Vol.I, p.7 (3-25) (Michaux Testimony). City Life Church does not own a building; therefore, various church meetings were held in the Michaux home. Trial Transcript at 2/22, Vol.I, p.6(24) - p.7 (2) (Michaux Testimony).

This townhouse is in the same neighborhood as the McKellar's, i.e., Hollymeade, where 36 or 37 of the 67 units have Chinese drywall. Chinese drywall has had a major impact on the neighborhood, as it is now about half-vacant. Trial Transcript at 2/22, Vol.I, p.6 (3-14) (Michaux Testimony). Venture Supply's records show that 45 sheets of Chinese drywall were delivered to the house during construction. P3.0494-0001, P3.0495-0001 (Venture Supply Documents), Trial Transcript at 2/22, Vol.I, p.5 (5-9) (Michaux Testimony). The expert testing by Knauf and the PSC confirmed that there is Chinese drywall on every floor of the Michaux home. Trial Transcript at 2/22, Vol.I, p.12 (24) - p.13 (6) (Michaux Testimony).

When Mr. and Mrs. Michaux moved into the house, they smelled an unusual odor, but thought it was from new construction. They noticed that the smell was even stronger when they got back from vacations after the house had been closed. Mrs. Michaux thought that the smell would fade as time passed, but it didn't. It got stronger. Trial Transcript at 2/22, Vol.I, p.7 (4-13) (Michaux Testimony). The smell lingers in the kids' school books, in all clothing and linens, and possessions. Mrs. Michaux cannot get the smell out of these things even now, although the family has not been back to live at the home in 6 months. Trial Transcript at 2/22, Vol.I, p.8 (20-23), p.9 (1-11) (Michaux Testimony). The Michaux family has had to prioritize items to replace due to the smell for financial reasons. The children got new mattresses. Other items were kept simply because the family cannot afford to replace them. Trial Transcript at 2/22, Vol.I, p.9 (11-16) (Michaux Testimony).

Mr. and Mrs. Michaux moved out of the townhome on September 5, 2009, just 2 days after confirmation that it had Chinese Drywall. They were concerned with CDW associated health issues with the children which prompted them to find an apartment and move out quickly. Trial Transcript at 2/22, Vol.I, p.8 (17-19), p.9 (3), p.10 (8-12) (Michaux Testimony). The Michaux son suffers from eczema and allergies. Trial Transcript at 2/22, Vol.I, p.12 (2-6) (Michaux Testimony).

One evening, Mr. and Mrs. Michaux turned off the power to the home, looked with a flashlight at their copper wires, and found them black. Trial Transcript at 2/22, Vol.I, p.9 (17) - p.10 (3) (Michaux Testimony). In the Michaux home there has been HVAC coil failures, as well as many electronic failures. P3.0480-0001- P3.0486-0001 (HVAC repair records), Trial Transcript at 2/22, Vol.I, p.10 (4-8) (Michaux Testimony).

The Michaux family's church moved the family from their home into a small apartment while they were on vacation, so the family would not have to sleep in a Chinese Drywall house anymore. Trial Transcript at 2/22, Vol.I, p.12 (7-14) (Michaux Testimony). It was emotionally difficult for this family to move out of their house. Mrs. Michaux thought they would spend many years in it. Trial Transcript at 2/22, Vol.I, p.11 (21) - p.12 (2) (Michaux Testimony).

For five months Mr. and Mrs. Michaux paid both their rent and their monthly mortgage of \$1,263.94. This was a great financial hardship for the family. P3.0637-0009- P3.0637-0010 (Supplemental Tuthill Exhibit), Trial Transcript at 2/22, Vol.I, p.10 (14-16) (Michaux Testimony). To survive the 5 months of paying rent and the mortgage, the Michaux family used emergency savings and cashed in stock. They did everything a family would do to protect their credit. P3.0455-0001- P3.0455-0002 (Line of credit statement), Trial Transcript at 2/22, Vol.I,

p.11 (5-9) (Michaux Testimony). In January, 2010, Mr. and Mrs. Michaux received a mortgage deferral from their mortgage company. While they do not make mortgage payments now, interest continues to accrue, and at the end of the deferral their mortgage schedule will be reassessed. The mortgage company will only commit to a 90 day deferral each time, so the deferral must re-negotiated every three months to ask for a new deferral. P3.0456-0001- P3.0456-0003 (Michaux Mortgage Deferral), Trial Transcript at 2/22, Vol.I, p.10 (10-14), p.10 (19-25) (Michaux Testimony). The bank will not guarantee extending the deferral; it remains possible that Mr. and Mrs. Michaux will have to walk away from their home and relinquish ownership to the bank. Trial Transcript at 2/22, Vol.I, p.11 (12-14) (Michaux Testimony). This accrued interest is also a hardship for the Michaux family. Trial Transcript at 2/22, Vol.I, p.11 (1-5) (Michaux Testimony). They have already met with a bankruptcy lawyer. Trial Transcript at 2/22, Vol.I, p.10 (14-17) (Michaux Testimony). The Michaux family moved out of the small apartment on February 1, 2010 to a rental house that could more comfortably accommodate the family. P3.0450-0001- P3.0450-0010 (Lease), Trial Transcript at 2/22, Vol.I, p.10 (5-9) (Michaux Testimony).

Mr. and Mrs. Michaux worked with counsel and the accountant to make sure the summary exhibit was an accurate statement of the financial damages. P3.0637-0009- P3.0637-0010 (Tuthill's Supplemental Exhibit Michaux-1 (Revised for Trial Testimony), Trial Transcript at 2/22, Vol.I, p.13 (18) - p.14 (2) (Michaux Testimony).

ii. Damages

The cost of remediation of the Michaux home is \$198,142.00. P1.2059-0001 (Wright's Remediation Estimate Averages), P3.0637-0009- P3.0637-0010 (Tuthill's Supplemental Exhibit

Michaux-1 (Revised for Trial Testimony), Trial Transcript at 2/22, Vol.I, p.13 (18) - p.14 (2) (Michaux Testimony).

The remediation of the Michaux home should take between 4 and 6 months.

The alternative living costs, non-recurring, both past and future for the Michaux's are \$10,576.70. P3.0637-0009- P3.0637-0010 (Tuthill's Supplemental Exhibit Michaux-1 (Revised for Trial Testimony)).

The alternative living costs recurring on a monthly basis post trial are \$2,397.90. P3.0637-0009- P3.0637-0010 (Tuthill's Supplemental Exhibit Michaux-1 (Revised for Trial Testimony)). Assuming remediation will occur in six months, the total monthly living costs are \$14,387.40.

The loss of personal property of the Michauxs is \$7,620.00. P3.0546-0001- P3.0546-0039 (Expert report of Dave Maloney), P3.0637-0009- P3.0637-0010 (Tuthill's Supplemental Exhibit Michaux-1 (Revised for Trial Testimony)).

The costs for repair of the Michaux property, both past and future, including the Home Environmental Inspection post remediation, is \$14,606.73. P3.0637-0009- P3.0637-0010 (Tuthill's Supplemental Exhibit Michaux-1 (Revised for Trial Testimony)).

The additional amounts owed by the Michauxs for mortgage deferral for 12 months are \$11,701.08. P3.0637-0009 - P3.0637-0010 (Tuthill's Supplemental Exhibit Michaux-1 (Revised for Trial Testimony)).

The additional expenses, offset by the property tax savings due to an assessment reduction, are a credit of \$1,426.11. P3.0637-0009 - P3.0637-0010 (Tuthill's Supplemental Exhibit Michaux-1 (Revised for Trial Testimony)), P3.0459-0001 (Property tax assessment).

Fred and Vanessa Michaux sustained a loss of use and enjoyment of both personal property and their home. After living in their townhome for only 19 months, they abandoned it due to Chinese Drywall. Within 2 days of confirmation of the Chinese Drywall they moved out, fearing for their health. This townhome was the center of the family, pastoral, and educational lives of the entire family, and the church. P3.0546-0001- P3.0546-0039 (Expert report of Dave Maloney), P3.0637-0009 - P3.0637-0010 (Tuthill's Supplemental Exhibit Michaux-1 (Revised for Trial Testimony), Trial Transcript at 2/22, Vol.I, p.4 (12) - p. 14 (2) (Michaux's Testimony)

Assuming remediation is complete within six months of trial, the total of damages proven by the Michauxs are \$255,607.80 plus an award for loss of use and enjoyment of the home and personal property to be determined by the Court. P3.0637-0009 - P3.0637-0010 (Tuthill's Supplemental Exhibit Michaux-1 (Revised for Trial Testimony).

*f. Preston and Rachel McKellar*

i. Background

Preston and Rachel McKellar own a townhome at 1008 Hollymeade Circle, Newport News, Virginia. P3.0357 (McKellar's deed), Trial Transcript at 2/19, Vol.II, p. 113 (11-14) (McKellar's Testimony). Preston and Rachel McKellar purchased the home on August 30, 2006 for the sum of \$197,110. P3.0357 (McKellar's deed), P3.0358 (McKellar's deed), Trial Transcript at 2/19, Vol.II, p.114(24)-p.115(2) (McKellar's Testimony). The townhome was appraised for \$198,000 at the time of purchase. P3.0360-0001- 0012 (McKellar's 2006 Appraisal). The townhome was appraised for \$249,000 at the time of refinance in April 2008. P3.0364-0001-0011 (McKellar's 2008 Appraisal). The townhome has 2,115 square feet. P1.2059-0001 (Wrights' Remediation Estimate Averages).

Preston and Rachel McKellar moved in the townhome in August of 2006. Trial Transcript at 2/19, Vol.II, p.116 (8) (McKellar's Testimony), P3.0637-0007 (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony)). This was Mr. and Mrs. McKellar's first home. Mr. McKellar is a middle school teacher who teaches science and social studies. Mrs. McKellar was a pediatric nurse but has been a housewife since William was born. Trial Transcript at 2/19, Vol.II, p.114 (14-23) (McKellar's Testimony). Trial Transcript at 2/19, Vol.II, p.116 (8) (McKellar's Testimony). Preston McKellar described how pleased the couple was with the home initially. Trial Transcript at 2/19, Vol.II, p.116 (5-6) (McKellar's Testimony). Preston and Rachel McKellar lived in the townhome until their son, William, was born. Trial Transcript at 2/19, Vol.II, p. 113 (21-25) (McKellar's Testimony).

The McKellars lived in their townhome about 3 years. Trial Transcript at 2/19, Vol.II, p.116 (11-13) (McKellar's Testimony). The McKellars moved out of the townhome about a month or two after they found out about Chinese Drywall. Trial Transcript at 2/19, Vol.II, p.114 (10-13) (McKellar's Testimony). Preston, Rachel, and William McKellar moved out of the townhome on November 7, 2009 as a consequence of suspected health effects of Chinese drywall. P3.0637-0007 (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony)), Trial Transcript at 2/19, Vol.II, p.113 (19-20) (McKellar's Testimony), Trial Transcript at 2/19, Vol.II, p.118 (1-15) (McKellar's Testimony). The McKellars' ultimately made the decision to move out of their townhome based on health concerns for their son symptoms associated with CDW. William had trouble breathing in his second floor nursery. Mrs. McKellar was having constant headaches. Mr. McKellar was congested and could hardly breathe. Once they learned the house had Chinese drywall, they decided to get out of the house as soon as

they could. Trial Transcript at 2/19, Vol.II, p.118 (91- 115) (McKellar's Testimony).

The McKellar's infant son's nursery was on the second floor of the townhome, the same floor which showed severe corrosion on wires, according to the testimony of Plaintiffs' expert Dr. John Scully. Hearing Dr. Scully's testimony was frightening for Mr. McKellar. Trial Transcript at 2/19, Vol.II, p.118 (16-25) (McKellar's Testimony). Rachel McKellar gave birth to a second son, Gabriel, 4 weeks ago. Trial Transcript at 2/19, Vol.II, p.114 (1-3) (McKellar's Testimony).

The townhome has Venture Supply Chinese Drywall. Trial Transcript at 2/19, Vol.II, p.115 (3-5) (McKellar's Testimony). The McKellars' first became aware they had Chinese drywall in their house when they received a letter saying the townhome may have Chinese Drywall. They asked their builder about it, and the builder assured them that the home did not. Trial Transcript at 2/19, Vol.II, p.115 (6-12) (McKellar's Testimony). The McKellars began experiencing persistent air conditioner and electrical problems and ultimately Mr. McKellar crawled into the attic, moved some insulation aside and saw that the drywall said Venture Supply on it. Trial Transcript at 2/19, Vol.II, p.115 (13-19) (McKellar's Testimony). The existence of Chinese drywall was confirmed by inspectors and scientists hired by counsel. Trial Transcript at 2/19 Vol.II, p.115 (19-22) (McKellar's Testimony).

The McKellars' first noticed electrical equipment failures within thirty (30) days after moving into their home. Trial Transcript at 2/19, Vol.II, p.116 (14-18), p.117 (1) (McKellar's Testimony). Virtually every month, there was an AC or heating failure in the McKellar home. Trial Transcript at 2/19, Vol.II, p.117 (1-3) (McKellar's Testimony). The HVAC technicians called on by the McKellars were required to constantly return. Mr. McKellar persisted in seeking their attention and eventually had the HVAC coil replaced. Trial Transcript at 2/19, Vol.II, p.117

(4-9) (McKellar's Testimony).

The community of Hollymeade is a close-knit group with an advisory board. Mr. McKellar and Mr. Michaux and 3 other homeowners sit on the board. Trial Transcript at 2/19, Vol.II, p.117 (13- 17) (McKellar's Testimony). Mr. McKellar kept in touch with other people in the community and noticed that all had similar complaints about their homes. Trial Transcript at 2/19, Vol.II, p.117 (18- 22) (McKellar's Testimony).

The McKellars now live in an apartment in the Featherstone Apartments. They have an 8 month lease. The apartment has 3 small bedrooms. Trial Transcript at 2/19, Vol.II, p.119 (1-7) (McKellar's Testimony).

Prior to the discovery of Chinese drywall in their home, the McKellars' prided themselves on being able to pay their bills and support the family. Mr. McKellar never thought he would ever have to think of bankruptcy. He has been researching bankruptcy. Trial Transcript at 2/19, Vol.II, p.120 (13-21) (McKellar's Testimony). Since discovering CDW and moving out of their home and into an apartment, the McKellars' are subsisting through loans and assistance from family and friends, as well as a mortgage moratorium. Trial Transcript at 2/19, Vol.II, p.119 (11-14) (McKellar's Testimony). The McKellars received a six (6) month moratorium on their mortgage beginning in January, although interest continues to run. Trial Deposition of J.D. Tuthill (2/4/10) at p.77 (24) - p.78(20). Their moratorium will expire in June and the McKellars will try to get an extension. Trial Transcript at 2/19, Vol.II, p.119 (18-19) (McKellar's Testimony). Even with the moratorium, the McKellars have to pay association dues, moving expenses, and a second mortgage note. P3.0637-0007 - P3.0637-0008 (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony), Trial Transcript at 2/19, Vol.II, p.119 (19-24)

(McKellar's Testimony). Mr. McKellar has gotten a second job, working more hours, which takes him away from his family. Trial Transcript at 2/19, Vol.II, p.121 (2-3) (McKellar's Testimony). The McKellar's savings are almost gone. Trial Transcript at 2/19, Vol.II, p.119 (23) (McKellar's Testimony). Mr. McKellar's cannot afford to pay both the mortgage of \$1,139 and rent of \$1,204 monthly indefinitely. P3.0637-0007 - P3.0637-0008 (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony), Trial Transcript at 2/19, Vol.II, p.120 (11-12) (McKellar's Testimony).

ii. Damages

Mr. McKellar has identified as accurate the summary of damages compiled by J.C. Tuthill. Trial Transcript at 2/19, Vol.II, p. 121(13)-p.122(2) (McKellar Testimony), P3.0637-0007 - P3.0637-0008, P3.0622-0008- P3.0622-0009 (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony).

The cost to remediate the McKellar townhome is \$194,720. P3.0637-0007 - P3.0637-0008, (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony), P1.2059-0001 (Wright's Remediation Estimate Averages).

The remediation will take between 4 and 6 months.

The alternative living costs for the McKellars which are non-recurring, both past and future, is \$19,623.21. P3.0637-0007 - P3.0637-0008 (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony), Trial Deposition of J.D. Tuthill (2/4/10) at p.31 (12-18).

The alternative living costs for the McKellars which recur monthly total \$1,211.13 monthly for the months of March-June 2010 and \$2,029.43 for July 2010 forward. P3.0637-0007 - P3.0637-0008 (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony), Trial

Deposition of J.D. Tuthill (2/4/10) at p.72 (14) - p.73 (16). Assuming it will take six months to remediate the McKellar's home, the total of monthly living costs will be \$8903.38.

On July 1, 2010 the McKellars will move into a larger rental property as the apartment is too small for their growing family. P3.0637-0007 - P3.0637-0008 (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony)).

The personal property loss of the McKellars' belongings total \$3,585. P3.0546-0001 - P3.0546-0039 (Expert report of David Maloney), P3.0637-0007 - P3.0637-0008 (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony)).

The cost to repair items damaged by Chinese Drywall, including the home environment inspection post-remediation, is \$13,998.35. P3.0637-0007 - P3.0637-0008 (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony)).

The additional costs associated with the McKellar mortgage moratorium for 12 months are \$10,914.48. P3.0637-0007 - P3.0637-0008 (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony)).

Mr. McKellar's lost income from his teaching job as a result of having to miss work and be home for repairmen is \$1336.60. P3.0637-0007 - P3.0637-0008 (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony)).

The McKellars' property assessment was lowered to \$100,600, resulting in a savings to the family of \$1,339.80. P3.0616-0001 (McKellar City of Newport News Property Information), P3.0637-0007 - P3.0637-0008 (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony)).

The McKellars have suffered the loss of use and enjoyment of their home. They began to

experience failures of the air conditioning and heat within 30 days of moving into their townhome, and only lived in the townhome (albeit in less than ideal living conditions due to numerous and frequent mechanical and electrical failures) for 35 months. They have been out of their townhome since November 2009. Trial Transcript at 2/19, Vol.II, p.113 (8) - p.122 (2) (McKellar's Testimony), P3.0546-0001 - P3.0546-0039 (Expert report of David Maloney), P3.0637-0007 - P3.0637-0008 (Tuthill's Supplemental Exhibit McKellar-1) (Revised for Trial Testimony).

Assuming remediation is complete within six months of trial, the total of damages proven by the McKellars is \$251,741.22, plus an award for loss of use and enjoyment of the home to be determined by the Court. P3.0637-0007 - P3.0637-0008 (Tuthill's Supplemental Exhibit McKellar-1 (Revised for Trial Testimony).

*g. Steven and Elizabeth Heischober*

*i. Background*

Steven and Elizabeth Heischober purchased their Chinese drywall duplex at 214A 80th Street, Virginia Beach, VA on November 10, 2006, for \$795,000. P3.0253-0001- P3.0253-0002 (Heischober Deed), Trial Transcript at 2/22, Vol.I, p.78 (25) - p.79 (4) (Heischober's Testimony), P3.0637-0003- P3.0637-0004 (Tuthill's Supplemental Exhibit Heischober-1 (Revised for Trial Testimony)). The Heischobers had previously lived in one home for 20 years and, when they sold that home, they made a substantial amount of money. They searched for a home in which to retire for more than a year. They wanted a first floor bedroom or elevator, and this home had both. It was ideal for them, and would suit them in their later years. Trial Transcript at 2/22, Vol.I, p.81 (8-23) (Heischober's Testimony). The Heischobers made a down payment of

\$345,000, a significant investment for them. Trial Transcript at 2/22, Vol.I, p.84 (25) -p.85 (1) (Heischober's Testimony). The duplex has 3,055 square feet. P1.2059- 0001 (Wright's Remediation Estimate Averages). The duplex is 1 ½ blocks from the Atlantic Ocean; west of the home is a state park with an entrance from the end of the street. The Heischobers enjoy long walks in the park and on the beach. They enjoy having pet dogs in the neighborhood. Trial Transcript at 2/22, Vol.I, p.79 (20) - p.80 (3), p.80 (14-15) (Heischober's Testimony). The Heischober duplex is well situated within walking distance from restaurants, festivals and events at the beach in the summer. Trial Transcript at 2/22, Vol.I, p.80 (4-6) (Heischober's Testimony). Steven and Elizabeth Heischober live in their duplex with their daughter Allison, who is a senior in college and lives with them for summer vacation and holidays. Trial Transcript at 2/22, Vol.I, p.80 (21) - p.81 (1-3) (Heischober's Testimony). Allison Heischober experienced some physical symptoms that have been associated with Chinese Drywall: rashes and respiratory issues. Trial Transcript at 2/22, Vol.I, p.81 (4-7) (Heischober's Testimony).

The Heischobers moved out of the duplex on August 28, 2009, about 6 weeks after finding out that it contained Chinese drywall. Trial Transcript at 2/22, Vol.I, p.80 (23-25) (Heischober's Testimony). Ten months after the Heischobers moved into the duplex, the transformer in their home was replaced. They experienced problems with both HVAC units' coils. The home had 2 air conditioners (upstairs and downstairs) and 7 coils were replaced in less than 3 years. The frequency of the replacements increased. The sixth coil was replaced in August 2009 and the replacement turned black in two months. The seventh coil was removed in December 2009 and not replaced. P3.0266-0001, P3.0267-0001, P3.0268-0001, P3.0269-0001, P3.0270-0001- P3.0270-0002, P.30271-0001, P3.0272-0001- p3.0272-0002, P3.0273-0001,

P3.0274-0001, P3-0275-0001, P3.0627-0001, P.3-0628-0001, P.30630-0001 (Invoices and work orders from Metro Mechanical for HVAC repairs), Trial Transcript at 2/22, Vol.I, p.82 (1-12), p.83 (3-7) (Heischober's Testimony), P3.0637-0003- P3.0637-0004 (Tuthill's Supplemental Exhibit Heischober-1 (Revised for Trial Testimony). One of the Heischober HVAC coils (number 6) was sent to Charlottesville to Dr. Scully as SLH 27. Trial Transcript at 2/22, Vol.I p.83 (8-12) (Heischober's Testimony). The Heischober's experienced many electric failures: a computer monitor failed and the hard drive crashed. Trial Transcript at 2/22, Vol1, p.82 (19-24) (Heischober's Testimony); in the spring of 2008 the Heischober TV failed, Trial Transcript at 2/22, Vol.I, p.82 (25) - p.83 (1) (Heischober's Testimony); a switch in the Heischober master bedroom closet failed. Trial Transcript at 2/22, Vol.I, p.83 (1-2) (Heischober's Testimony). The Heischober's clothes dryer was tested, which testing revealed corrosion on the inside of the dryer. Trial Transcript at 2/22, Vol.I, p.83 (13-25), p.84 (6-9) (Heischober's Testimony). The Heischobers are seeking replacements for all their appliances. Trial Transcript at 2/22, Vol.I, p.84 (10-12) (Heischober's Testimony).

One of Mrs. Heischober's biggest concerns is the potential of improper remediation in the other owner's duplex side. With the common wall possibly being made of stacked drywall, if the other owner remediates later than the Heischobers, the dust and debris can come into their side. Trial Transcript at 2/22, Vol.I, p.84 (13-24), p.85 (3-4) (Heischober's Testimony)

The Heischobers moved out of their home on August 28, 2009. They do not plan to return, without full remediation of the property. Trial Transcript at 2/22, Vol.I, p.85 (5-6) (Heischober's Testimony).

The Heischobers, on discovering that their home had Chinese drywall, obtained estimates

on their own to have their home fixed. The amount of the estimate was staggering, and the bank would not loan them the money for the remediation. Trial Transcript at 2/22, Vol.I, p.85 (9-22) (Heischober's Testimony). The Heischobers have delayed any action to repair, pending a proper protocol to remediate. Trial Transcript at 2/22, Vol.I, p.85 (22) - p.86 (1) (Heischober's Testimony).

Mrs. Heischober worked with counsel and a forensic accountant to calculate damages. She has reviewed the latter's summary and finds it accurate and complete. Trial Transcript at 2/22, Vol.I, p.86 (18) - p.87 (3) (Heischober's Testimony).

ii. Damages

The remediation of the Heischober home will take between 4 and 6 months.

The cost of remediation of the Heischober side of the duplex is \$312,755. P1.2059-0001 (Wright's Remediation Estimate Averages), P3.0637-0003-P3.0637-0004 (Tuthill's Supplemental Exhibit Heischober-1 (Revised for Trial Testimony)).

The non-recurring alternative living costs, both past and future, for Mr. and Mrs. Heischober are \$11,006.84. P3.0637-0003-P3.0637-0004 (Tuthill's Supplemental Exhibit Heischober-1 (Revised for Trial Testimony)).

The monthly recurring alternative living costs for the Heischobers post-trial are \$1,822.50 monthly. P3.0637-0003-P3.0637-0004 (Tuthill's Supplemental Exhibit Heischober-1 (Revised for Trial Testimony)). Assuming the remediation will take six months, the total monthly recurring costs are \$10,935.

The Heischober's loss of personal property is \$12,004. P3.0546-0001-P.30546-0039 (Expert Report of David Maloney), P3.0637-0003-P3.0637-0004 (Tuthill's Supplemental Exhibit

Heischober-1 (Revised for Trial Testimony).

The repair costs of the Heischobers, including both past and future expenses and the Home Environmental Inspection post-remediation, are \$17,314.66. P3.0637-0003-P3.0637-0004 (Tuthill's Supplemental Exhibit Heischober-1 (Revised for Trial Testimony)).

The additional costs the Heischobers will pay for the mortgage deferral for 12 months are \$19,656.48. P3.0637-0003-P3.0637-0004 (Tuthill's Supplemental Exhibit Heischober-1 (Revised for Trial Testimony), Trial Deposition of J.C. Tuthill (2/4/10) at p.48 (4) - p.49 (19)).

The Heischobers were granted a property tax reduction by the assessor of \$2,785.71. P3.0637-0003-P3.0637-0004 (Tuthill's Supplemental Exhibit Heischober-1 (Revised for Trial Testimony), Trial Deposition of J.C. Tuthill (2/4/10) at p.49 (20) - p.50 (21)).

The Heischobers have suffered the loss of use and enjoyment of their home and their personal property. Their retirement home in an idyllic neighborhood is now their albatross. The electronic breakdowns began just 10 months after they moved into the home. From that month forward, they were plagued with appliance failures and attempted repairs. They had 7 HVAC coils replaced in about a 2 year period. They abandoned the home and their belongings in August 2009. Deprived of the use and enjoyment of their home for more than 7 months, they now live in a state of disruption. Trial Transcript at 2/22, Vol.I, p.78 (19) - p.87 (14) (Heischober's Testimony), P3.0546-0001 - P3.0546-0039 (Expert report of David Maloney), P3.0637-0003-P3.0637-0004 (Tuthill's Supplemental Exhibit Heischober-1 (Revised for Trial Testimony))).

Assuming remediation is complete within six months of trial, the total of damages proven by the Heischobers is \$380,886.27, plus an award for loss of use and enjoyment of the home to

be determined by the Court. P3.0637-0003-P3.0637-0004 (Tuthill's Supplemental Exhibit Heischober-1 (Revised for Trial Testimony)).

### **III.CONCLUSION**

In summary, based upon the Findings of Fact and Conclusions of Law, the Court finds that scientific, economic, and practicality concerns dictate that the proper remediation for the Plaintiff-intervenors is to remove all drywall in their homes, all items which have suffered corrosion as a result of the Chinese drywall, and all items which will be materially damaged in the process of removal. Accordingly, the Court further finds that the Plaintiff-intervenors are entitled to recover damages as follows:

- a. Plaintiff intervenors William and Deborah Morgan have suffered property damages, personal property damages, and other forms of compensable damages in the amount of \$381,613.29. In addition, the Court finds that Plaintiff intervenors William and Deborah Morgan have suffered loss of use and enjoyment damages in the amount of \$100,000.00. The Court awards Plaintiff intervenors William and Deborah Morgan total damages, caused by Taishan, in the amount of \$481,613.29.
- b. Plaintiff intervenors Jerry and Inez Baldwin have suffered property damages, personal property damages, and other forms of compensable damages in the amount of \$341,699.11. In addition, the Court finds that Plaintiff intervenors Jerry and Inez Baldwin have suffered loss of use and enjoyment damages in the amount of \$100,000.00. The Court awards Plaintiff intervenors Jerry and Inez Baldwin total damages, caused by Taishan, in the amount of \$441,699.11.
- c. Plaintiff intervenors Joseph and Cathy Leach have suffered property damages,

personal property damages, and other forms of compensable damages in the amount of \$59,676.86. In addition, the Court finds that Plaintiff intervenors Joseph and Cathy Leach have suffered loss of use and enjoyment damages in the amount of \$30,000.00. The Court awards Plaintiff intervenors Joseph and Cathy Leach total damages, caused by Taishan, in the amount of \$89,676.86.

d. Plaintiff intervenors Bob and Lisa Orlando have suffered property damages, personal property damages, and other forms of compensable damages in the amount of \$307,905.44. In addition, the Court finds that Plaintiff intervenors Bob and Lisa Orlando have suffered loss of use and enjoyment damages in the amount of \$100,000.00. The Court awards Plaintiff intervenors Bob and Lisa Orlando total damages, caused by Taishan, in the amount of \$407,905.44.

e. Plaintiff intervenors J. Frederick and Vanessa Michaux have suffered property damages, personal property damages, and other forms of compensable damages in the amount of \$255,607.80. In addition, the Court finds that Plaintiff intervenors J. Frederick and Vanessa Michaux have suffered loss of use and enjoyment damages in the amount of \$100,000.00. The Court awards Plaintiff intervenors J. Frederick and Vanessa Michaux total damages, caused by Taishan, in the amount of \$355,607.80.

f. Plaintiff intervenors Preston and Rachel McKeller have suffered property damages, personal property damages, and other forms of compensable damages in the amount of \$251,741.22. In addition, the Court finds that Plaintiff intervenors Preston and Rachel McKeller have suffered loss of use and enjoyment damages in the amount of \$100,000.00. The Court awards Plaintiff-intervenors Preston and Rachel McKellar total

damages, caused by Taishan, in the amount of \$351,741.22.

g. Plaintiff intervenors Steven and Elizabeth Heischober have suffered property damages, personal property damages, and other forms of compensable damages in the amount of \$380,886.27. In addition, the Court finds that Plaintiff intervenors Steven and Elizabeth Heischober have suffered loss of use and enjoyment damages in the amount of \$100,00.00. The Court awards Plaintiff intervenors Steven and Elizabeth Heischober's total damages, caused by Taishan, in the amount of \$480,886.27.

In sum, the Court awards all seven Plaintiff intervenor families monetary damages for their losses caused by the defendant Taishan in the total amount of \$2,609,129.99.

New Orleans, Louisiana, this 8th day of April 2010.

A handwritten signature in cursive script that reads "Eldon E. Fallon". The signature is written in black ink and is positioned above a horizontal line.

ELDON E. FALLON  
UNITED STATES DISTRICT JUDGE