UNITED STATES OF AMERICA
BEFORE THE FEDERAL TRADE COMMISSION

In the Matter of	)	
	)	**Docket No. 9327**
	)	
Polypore International, Inc.	)	**PUBLIC**
a corporation	)	
	)	

RESPONDENT'S PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW

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I. EXHIBIT AND WITNESS INDICES

A. Exhibit Index

1. *See* Exhibit A hereto.

B. Witness Index

2. *See* Exhibit B hereto.

II. PROCEDURAL BACKGROUND

A. Transaction Background

3. On February 29, 2008, a subsidiary of Polypore International, Inc. ("Polypore") {

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} (PX0162, *in camera*) Polypore acquired Microporous for approximately $72.5 million, $29 million in cash and $47 million in assumed debt. (RX01572 at ¶4; PX0800 at 002, *in camera*) Due to the small value of the transaction, the parties were not required to make a premerger notification filing under the Hart-Scott-Rodino Antitrust Act. (Toth, Tr. 1557, 1559; PX0800 at 2, *in camera*).

B. Pre-Hearing Background

4. On March 7, 2008, the FTC initiated a non-public investigation into the Acquisition. During its investigation, the FTC issued Civil Investigative Demands to Polypore, its Daramic subsidiary and various third parties, and conducted many investigational hearings. The FTC then proceeded to issue a Part 3 Complaint in this matter on September 9, 2008, alleging that the Acquisition violated Section 5 of the Federal Trade Commission Act, as amended, 15 U.S.C. § 45 ("Section 5") and Section 7 of the Clayton Act, as amended, 15 U.S.C. §18, and that Polypore monopolized or attempted to monopolize certain product markets in North America. (RX01572

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at 8-9). On October 15, 2008, Polypore filed its Answer and Defenses, which denied the FTC's allegations and set forth its affirmative defenses. (RX01589).

5. An initial Scheduling Order was entered in the case on October 22, 2008, setting forth a discovery cut-off date of February 13, 2009 and a trial date of April 14, 2009. (RX01591). Due to extensive third party discovery issues, the Scheduling Order was amended to extend these and other remaining deadlines by four weeks. (ALJ Order dated Feb. 4, 2009).

C. Hearing Summary

6. The hearing commenced in this case on May 12, 2009 and concluded on June 12, 2009. During the 22 days of actual trial proceedings, live testimony was received into the hearing record from the following 30 witnesses:

Witnesses Related to Polypore/Daramic/Microporous

- Robert Toth, CEO and President of Polypore
- Pierre Hauswald, General Manager and VP of Daramic
- Sterling Tucker Roe, VP of Worldwide Sales and Marketing of Daramic
- Harry Seibert, VP and Business Director of Daramic
- Tim Riney, VP of Finance of Daramic
- Christopher Thuet, Business Director Asia-Pacific of Daramic
- Hans-Peter Gaugl, Managing Director Austrian Facility for Daramic Austria GmbH (also former Manager of Austrian facility for Microporous)
- John Kevin Whear, VP of Technology of Daramic
- Larry Trevathan, VP Operations of Daramic (also former VP Operations of Microporous)
- Steven McDonald, Sales Manager, North America of Daramic (also former Director of Sales of Microporous)
- Michael Gilchrist, formerly CEO and President of Microporous
- George Brilmyer, formerly Director of Research & Development of Microporous

- Michael Graff, Managing Director of Warburg Pincus (also Chairman of the Board of Directors of Polypore)

Witnesses Related to Battery Manufacturers

- Richard Godber, CEO and President of Trojan Battery
- Donald Wallace, Executive VP of Sales and Marketing of U.S. Battery Mfg. Co.
- Nawaz Qureshi, VP of Engineering and Technology of U.S. Battery Mfg. Co.
- Larry Axt, VP of Global Procurement of EnerSys
- Larry Burkert, Senior Procurement Manager of EnerSys
- John Gagge, Jr., Sr. Director Engineering and Quality Assurance for EnerSys
- John Craig, Chairman, CEO and President of EnerSys
- Rodger Hall, Global VP of Procurement for Johnson Controls Battery
- Mitchell Bregman, Exide Technologies (former procurement council)
- Melvin Gillespie, Jr., VP of Global Procurement for Exide Technologies
- Norman Benjamin, President of Bulldog Battery Corporation
- Dale Leister, Director Procurement Strategy & Supplier Dev., East Penn Mfg.
- James Douglas, Executive VP of Douglas Battery Mfg. Co.
- Arthur Balcerzak, Director of Purchasing for Crown Battery (as consultant)
- Daniel Weerts, Vice President of Sales and Marketing of Entek Holding Company

Expert Witnesses

- John Simpson, FTC Economist (Complaint Counsel's expert witness)
- Henry J. Kahwaty, Ph.D., Director of LECG (Respondent's expert witness)

7. In addition, for certain witnesses who were unavailable to attend trial proceedings, testimony was received into the record through admission of certain deposition transcripts and investigational hearings, subject to any lodged objections. See JX3, JX8, JX9.

8. The hearing record in this case was closed by Order dated June 22, 2009. Concurrent reply briefs and replies to findings of fact are due to be filed by the FTC and Respondent on July 31, 2009. Closing arguments are scheduled for August 20, 2009.

III. THE BATTERY SEPARATOR INDUSTRY

A. Terminology

9. The following provides a glossary of some of the recurring terms and separator product names referred to in the testimony, documents and deposition/investigational hearing transcripts:

10. **AGM** – initials which refer to "absorbptive glass mat" battery separators. The liquid in the battery is absorbed like a sponge into the glass mat part of the separator and there is no free liquid electrolyte. AGM batteries are sealed and do not need maintenance. (Godber, Tr. 147; Hauswald, Tr. 994-95; Qureshi, Tr. 2055-56).

11. **ACE-SIL®**– product name of a hard rubber battery separator developed by Microporous (and now sold by Daramic) that is made from rubber silicon. This pure rubber product is very stiff and typically used in very high end stationary applications such as telecommunications, back up power for nuclear plants, and military products. (Gilchrist, Tr. 300; Hauswald, Tr. 992; Roe, Tr. 1748; McDonald, Tr. 3786; RX01638 (physical product sample)).

12. **Aftermarket** – refers to the market for replacement batteries for products (in contrast to original equipment batteries). (Godber, Tr. 143-44; Gillespie, Tr. 2932).

13. **Antimony** – refers to an antimony alloy that is sometimes included in the composition of the positive plate of a battery used for deep-cycle applications in order to improve battery performance. Antimony can have a tendency to travel from the positive plate to the negative plate during usage, which could eventually lead to reduced battery performance. The addition of rubber to a battery separator can help reduce the rate of antimony transfer. (Godber, Tr. 138-40, 149-50; Whear, Tr. 4667-68, 4683-84; PX1791 at 001).

14. **Backweb Thickness** – a primary measurement of a battery separator that is the thickness of the substrate in space between membranes of a rib. Simply put, it is the thickness of the separator that is measured between the ribs. The backweb thickness serves to create a wall of insulation in the battery between plates. (Hauswald, Tr. 966-67, 979; Leister, Tr. 4044; Whear, Tr. 4685, 4688; PX0669, *in camera*).

15. **Battery Separators** – products of various composition that are porous insulators placed between positively and negatively charged plates in batteries to prevent electrical short circuits while allowing ionic current to flow through the separators. (Gilchrist, Tr. 314; Hauswald, Tr. 968-69; Benjamin, Tr. 3504; Whear, Tr. 4665-66).

16. **Black Scum** – refers to a dark-colored residue that can gather on the liquid surface inside a polyethylene or polyethylene-based flooded lead-acid battery during usage. The black scum can result from the interaction of various chemicals and the oil component of a separator through a process of oxidation. (Hauswald, Tr. 1096-98; Brilmyer, Tr. 1834-35; Whear, Tr. 4707-08).

17. **CellForce** – product name for a polyethylene battery separator developed by Microporous (and now sold by Daramic) for deep-cycle applications that includes ground up ACE-SIL® rubber product as an additive in the polyethylene matrix of the separator to improve performance. (Gilchrist, Tr. 337-38, 340; Hauswald, Tr. 672-73, 993; RX01640 (physical product sample)).

18. **Daramic HD** – product name of a Daramic polyethylene battery separator made with a liquid latex additive for deep-cycle applications. (Hauswald, Tr. 671-72; PX0949 at 004, *in camera*; PX0319 at 007).

19. **Darak** – product name of a non-PE Daramic battery separator made with cross-linked phenolic resin for more porosity. The separator is made only in Germany and is typically used in gel type batteries. (Hauswald, Tr. 989-90; Whear, Tr. 4681; PX0582 at 051).

20. **Deep-cycle** – refers to certain end use applications for batteries where the batteries are placed in products having a lower amperage draw over a longer duration of time. These batteries are repeatedly discharged deeply to a low state of charge prior to recharging. Example applications include golf carts, floor scrubbers, scissor lifts, utilities, and marine boat applications. (Godber, Tr. 137-38; Gillespie, Tr. 2931; Whear, Tr. 4682, 4694; PX0319 at 007-008).

21. **FLEX-SIL®** - product name of a premium battery separator product developed by Microporous (and now sold by Daramic) that is made of pure rubber (no polyethylene) for use in deep cycle applications such as golf carts, floor scrubbers and aerial lifts. FLEX-SIL® product is sold only in "leaf" cut-piece form. (Roe, Tr. 1737, 1749; Hauswald, Tr. 992-93, McDonald, Tr. 3787; RX01639 (physical product sample)).

22. **Flooded Lead-Acid Battery** – a battery that has liquid acid in it up to a level above the positive and negative lead plates. Due to repeated charging and discharging, especially in deep-cycle applications, liquid will have a tendency to evaporate and the battery will need to be watered at certain intervals (except in a sealed, no maintenance automotive battery). (Godber, Tr. 147; Brilmyer, Tr. 1841; Qureshi, Tr. 2053-54; Whear, Tr. 4682)

23. **Enveloping** – instead of having the battery separator material cut into separate smaller "leaf" pieces, the battery manufacturer will purchase the material in roll form and itself fold the separator material around the plates of the batteries and seal it on the side (thus "enveloping" the plate like it is in a pouch). (Roe, Tr. 1748-49; Qureshi, Tr. 2036; PX1791 at 002) This process also can be referred to by a battery manufacturer as "sleeving". (Benjamin, Tr. 3508).

24. **Gel (Non-Flooded) Battery** – instead of having a liquid lead-acid like flooded batteries, these batteries (such as an AGM battery) have a gel silica that interacts with the positive and

negative plates of the battery to allow for ionic transfer. (Godber, Tr. 147; Gaugl, Tr. 4557; Whear, Tr. 4681).

25. **Industrial Separators** – refers to separators for all industrial applications for batteries, including industrial motive power or industrial stationary batteries. (Roe, Tr. 1815; Whear, Tr. 4682-83).

26. **Leaf Separator** – refers to battery separator material that has been cut into pieces (i.e., "leafs"), and many of these pieces will be stacked together in between plates and used in a single battery. (Roe, Tr. 1748-49; PX1791 at 2).

27. **Motive Power** – refers to an end use application of batteries for certain industrial products that move, such as forklifts and mine equipment. (Gilchrist, Tr. 306; Roe, Tr. 1197; Balcerzak, Tr. 4092; Whear, Tr. 4694).

28. **OE/OEM** – generally synonymous terms for original equipment or original equipment manufacturer. These types of batteries are installed as original equipment on a product (in contrast to batteries for the "aftermarket" which are replacement batteries). (Roe, Tr. 1762-63; Gillespie, Tr. 2932).

29. **Overall Thickness** – a primary measurement of a battery separator that measures the overall thickness of the product including the ribs (e.g., thickness of substrate and height of ribs together). Overall thickness serves to provide the space between electrodes and make a reservoir for the liquid. (Hauswald, Tr. 966-67, 979; Leister, Tr. 4044; Whear, Tr. 4688-89). (For demonstrative purposes see PX0669, *in camera*).

30. **PE Separators** – abbreviation for a polyethylene battery separator. Daramic's polyethylene battery separators are formulated from ultra high molecular weight polyethylene, as well as other ingredients such as silica and oil. (Toth, Tr. 1501, 1549; PX0582 at 041, 043). Certain PE separators include additional additives as well. (PX0582 at 043-050; PX0949 at 003-

4, *in camera*). These products are sold under trade names/trademarks that include Daramic Standard, Daramic HP, Daramic V, Daramic HD, Daramic HPR, Daramic HP-S, Daramic HPO, Daramic Duralife, Daramic W and Daramic CL. (PX0582 at 043-050; PX0949 at 003-004, *in camera*).

31. **Profile** – profile refers to the specifications of a separator and includes the thickness of the backweb as well as the shape of the ribs, i.e., whether they are vertical, diagonal, or S-shaped, along with the height and density of the ribs. Daramic offers a choice of approximately 80 profiles with its battery separators (Whear, Tr.4675-76).

32. **Reserve Power** – an end use application for batteries where the batteries are used to provide back-up or reserve power to a system. (Gilchrist, Tr. 306; Axt. Tr. 2099; Douglas Tr. 4052-53).

33. **Ribs** – protrusions on the separator. The ribs, which vary in height, thickness or shape from separator to separator, help fix the physical spacing in the battery to make sure there is an appropriate amount of acid between the plates. The shapes and sizes of these ribs make up part of the "profile" of the separator. (Hauswald, Tr. 966-67; Whear, Tr. 4665-67, 4675-76; PX1791 at 002).

34. **SLI** – abbreviation refers to an end use application for batteries known as "starter, lighting, and ignition," which is generally synonymous with an automotive-type application for batteries. Examples of SLI batteries include those placed in automobiles, trucks, buses, boats, snowmobiles, jet skis and recreational vehicles. (Brilmyer, Tr. 1831-32; Gillespie, Tr. 2390, *in camera*; Leister, Tr. 3976-77).

35. **Stationary** - refers to an end use application for a battery where the product is stationary, such as large back-up batteries for telecommunications, emergency lighting, UPS or other reserve power application. (Roe, Tr. 1736, 1816-17; Whear, Tr. 4692).

36. **Traction** – refers to an end use application for batteries in certain industrial products (e.g., electric forklifts). Term generally synonymous with "motive power" applications. "Motive power" is typically referred to in U.S., while "traction" is typically referred to globally. (Roe, Tr. 1250; Balcerzak, Tr. 4092).

37. **UPS** – refers to an end use application for batteries known as "uninterruptible power supply" or "uninterruptible power source" products. These are batteries for emergency power use in case of a power outage/stoppage. Examples include back-up stationary batteries for computer systems, telecommunications systems, and cell phone towers. UPS batteries are generally considered to be a type of reserve power batteries. (Gilchrist, Tr. 306; Roe, Tr. 1736-37; Brilmyer, Tr. 1832-33; Douglas Tr. 4052-53).

38. **VRLA** – abbreviation refers to valve-regulated lead-acid battery. VRLA is simply another name for an AGM battery. (Godber, Tr. 366; Douglas, Tr. 4052).

B. <u>The Product and The Relevant Product Market</u>

a. <u>The Role of a Battery Separator</u>

(a) Physical Characteristics

39. Lead acid batteries are made up of three primary components: a positive electrode, a negative electrode, and an electrolyte. (PX2110 at 010). The cells of a battery are made up of electrodes which are lead plates that are positively and negatively charged. (PX2110 at 010). The plates are stored in the electrolyte, which is a solution of sulphuric acid. (PX2110 at 010). The cell discharges electrons as the acid slowly changes the lead in the plates into lead sulphate. (PX2110 at 010). An electric current then flows if the terminals are connected through a conductor. (PX2110 at 010). When an electric current is being drawn from a battery it is being discharged. (PX2110 at 010).

40. A battery separator is a porous insulator placed between two plates of opposing polarity to prevent electrical short circuits while allowing ionic current to flow through the separator. (PX2110 at 010). From this standpoint, a battery separator is a passive element in a lead-acid battery. (Whear, Tr. 4666).

41. {

} (PX2110 at 010; Douglas, Tr. 4072, *in camera;* Craig, Tr. 2553 (3-4%)).

42. A battery separator serves two primary functions. (Whear, Tr. 4666).

43. First, it prevents the positive and negative electrodes from having contact. If the positive and negative electrodes come into physical contact with each other, the cell will short out with no voltage or energy. While a separator needs to prevent physical contact, it must allow ions or electrolytes to flow back and forth within the battery which is why separators are porous. This function is performed primarily by the microporous backweb of a battery separator. (Whear, Tr. 4666).

44. The second function of a battery separator is to provide physical spacing. The separator fixes a physical spacing between the electrodes. The function is performed primarily by the ribs of a battery separator. A battery separator may have taller and shorter ribs depending upon the desired amount of acid between the plates. (Whear, Tr. 4666; Hauswald, Tr. 966-69).

45. Separators are characterized by their backweb thickness and their overall thickness. Backweb thickness denotes the thickness of the substrate between the ribs. Overall thickness is the height of the ribs, including the substrate thickness. Both thicknesses are measured in the unit mils or thousandths of an inch. (Whear, Tr. 4688-89)(For illustrative purposes see RX00945 at 167, *in camera*).

46. Battery manufacturers who purchase separators target a certain overall and backweb thickness in the separators they purchase, but a certain degree of tolerance is accepted within the industry. The typical tolerance for the backweb thickness is plus or minus one and one-half mils. The typical tolerance for the overall thickness is plus or minus three mils (or plus or minus four mils if the separator has a glass mat laminate). (Whear, Tr. 4689-90).

47. Battery separators can be made out of glass, paper, polyvinyl chloride ("PVC"), rubber, polyethylene, cellulosic and polypropylene. (Whear, Tr. 4666; Hauswald, Tr. 960; PX2110 at 010).

48. The main variables in a battery separator are the backweb thickness, the shape and/or height of the ribs, whether or not a laminate is used (a glass mat for instance), and whether an additive is used. (Whear, Tr. 4667).

49. An additive can serve a variety of functions in a battery separator such as serving as a wetting agent, improving oxidation resistance, improving water loss, and/or suppressing antimony. (Whear, Tr. 4668).

50. The most common types of additive are ones intended to suppress antimony. These additives include rubber, lignin, and various other organic chemicals. (Whear, Tr. 4668).

51. Various additives which may be used in battery separators to suppress antimony poisoning are commercially available. (Whear, Tr. 4668).

52. For example, Daramic uses a rubber additive which is commercially available from BASF. (Whear, Tr. 4668).

53. Additionally, the company Ensci, Inc., which was founded by Thomas Clough, has produced and patented organic chemical additives, in conjunction with Trojan Battery, which could be used in battery separators to suppress antimony. (Whear, Tr. 4670-75; RX00674; RX00675; RX00676).

54. In 2005, Ensci, Inc. offered to sell these additives to Daramic for use in Daramic's battery separators, but Daramic declined as it was already using a different additive to suppress antimony. (Whear, Tr. 4675, 4771).

55. A battery separator "profile" refers to the thickness of the backweb along with the shape of the separator's ribs (whether they are vertical, diagonal, or S-shaped), the density of these ribs, and the height of these ribs. (Whear, Tr. 4675).

56. Daramic produces approximately 80 different separator profiles. (Whear, Tr. 4675-76).

57. Daramic works with its customers to develop separator profiles which are suitable for the customer's batteries. (Whear, Tr. 4677).

58. A separator profile can be further differentiated by its backweb thickness (the thickness between the ribs), its overall thickness, and the formula used. (Whear, Tr. 4685). Considering these variables, Daramic offers over 5000 different product offerings or SKU's. (Whear, Tr. 4685-86).

59. Some separator profiles have become standardized or widely accepted by customers. This is most common in separators that are used in SLI end-use applications. (Whear, Tr. 4686).

60. Non-standard profiles are designed through collaboration with individual customers whereby a separator profile is prototyped, tested, and verified, and then once approved a calender roll will be grooved for that particular profile. (Whear, Tr. 4686).

(b) End-Uses

61. Polyethylene based separators are manufactured for myriad end-uses, including starting, lighting, and ignition batteries, stationary batteries, batteries that provide backup power, batteries that provide emergency power, and batteries that are deeply discharged. (Whear, Tr. 4679).

62. Generally, a separator manufacturer does not know for certain which end-use application a particular separator will be used in. (Whear, Tr. 4687-88; Hauswald, Tr. 974-75, 978; Weerts, Tr. 4456, *in camera*).

63. This is true even if the manufacturer, such as Daramic, knows that a particular separator is going to a specific customer, as customers often withhold this level of detail when purchasing separators. (Whear, Tr. 4688; Hauswald, Tr. 978; Douglas, Tr. 4057-59).

64. The end use application of a battery separator can be generally, but not precisely, determined by looking at the physical dimensions of the separator. (Whear, Tr. 4690).

65. Battery separators used in SLI or automotive applications have overall thicknesses ranging from 7 mils to 75 mils, and backweb thicknesses ranging from 5 mils to 12 mils. (Whear, Tr. 4690-91, 4697; for illustrative purposes see RX01662).

66. Battery separators used in deep-cycle applications have overall thicknesses ranging from 35 mils to 100 mils, and backweb thicknesses ranging from 8 mils to 15 mils. (Whear, Tr. 4691-92, 4697; for illustrative purposes see RX01662).

67. Battery separators used in stationary applications have overall thicknesses ranging from 11 mils to 200+ mils, and backweb thicknesses ranging from 11 mils to 32 mils. (Whear, Tr. 4692, 4698)(For illustrative purposes see RX01662).

68. Battery separators used in motive power applications have overall thicknesses ranging from 60 mils to 140 mils, and backweb thicknesses ranging from 13 mils to 25 mils. (Whear, Tr. 4694-95, 4698)(For illustrative purposes see RX01662).

69. A battery separator cannot be grouped into a product market based on its backweb thickness and overall thickness. (Whear, Tr. 4699).

70. There is overlap between the size of separators used in different end-use application such that battery separators of the same size or thickness can be used in multiple end-use applications.

(Whear, Tr. 4695, 4699; RX00677; *in camera*)(For illustrative purposes see Kahwaty Slide No. 44). For example, Daramic's AU profile has a 12 mil backweb thickness and a 39 mil overall thickness. This profile, which has yearly sales in excess of one million dollars, is used by a customer, Exide India, in a stationary application but is also used by a customer, Shin-Kobe, in an SLI application. (Whear, Tr. 4699-4700, 4767).

71. Daramic's flat-sheet profile is another example. This profile is sold to AT&T at an 11 mil backweb and overall thickness for use in a stationary application and is also sold to Concorde at a 10 mil backweb and overall thickness for use in a SLI application. (Whear, Tr. 4700).

72. {

} (PX1450, *in camera*). {

} (PX1450, *in camera*).

73. {

} (Seibert, Tr. 4188, *in camera*).

74. There is also a fair amount of end-use overlap in separators with a backweb thickness in the 11-12 mil range. (Hauswald, Tr. 984-985)(For illustrative purposes see RX01662). Within the 12 mil backweb range, for example, one would find separators used in automobiles (SLI), golf carts (deep cycle) and telecom batteries (stationary). (Hauswald, Tr. 984-985). (For illustrative purposes see Kahwaty Slides at No. 44). {

}. (RX00677, *in camera*).

75. The ranges of backweb and overall thicknesses set forth above do not include the width tolerances permitted in the battery separator industry. (Whear, Tr. 4702). Including the width tolerances in these ranges would increase the overlap of separator sizes between different end-use applications. (Whear, Tr. 4702).

76. Many separator profiles are used in more than one of the FTC's relevant markets. Thus, polyethylene products with the same rib profile are sold for use in batteries found in different end-use applications. (Whear, Tr. 4699-4702) (For illustrative purposes see RX01662).

77. For example, {

} (Seibert, Tr. 4186-89, *in camera*; RX00631, *in camera*; RX00677, *in camera*; RX01119, *in camera*; RX01323, *in camera*; RX01604, *in camera*; RX01605, *in camera*; PX1450, *in camera*).

78. As a result, it is inaccurate to separate a polyethylene separator used for one end-use application from a polyethylene separator used in other end-use applications. (Whear, Tr. 4694). By way of example, there is no distinction in the functionality of a separator used in a so-called motive power battery and a separator used in any other type of deep cycling battery. The separators in each of these applications both serve the same function within the battery. Each battery is used to move something (a golf cart, a forklift, or a mining vehicle) and both are deeply discharged and then recharged. (Whear, Tr. 4694).

(c) Types of Separators

79. Polyethylene separators were patented in 1967 by W.R. Grace. (Whear, Tr. 4678-79).

80. The patent on the polyethylene separator expired in the mid-1980s, and thereafter, the information necessary to manufacture polyethylene separators was publicly available. (Whear, Tr. 4679; Toth, Tr. 1626). Consequently, there are no patent barriers which would prevent any individual or company from manufacturing a polyethylene separator. (Toth, Tr. 1626).

(d) Daramic Products

81. {

} (PX0949 at 003, *in camera*).

(i) Polyethylene Separators - "Daramic"

82. {

} (PX0949 at 003, *in camera*).

83. {

} (PX0950 at 042, *in camera*).

84. {

} (PX0949 at 003, *in camera*). (For illustrative purposes see RX01636, RX01633).

85. {

} (PX0949-003, *in camera*).

86. {

} (PX0582 at 42; PX0949 at 003, *in camera*).

87. {

} (PX0949 at 003, *in camera*). Daramic HP is formulated from ultra-high molecular weight polyethylene, amorphous silica and specially formucalted oil. (PX0582 at 44). This product offers excellent puncture and oxidation resistance for increased life in flooded lead-acid battery applications. (PX0582 at 44). Daramic HP is used in most end-use applications, including stationary and automotive batteries, and can be produced in a wide range of thicknesses. (Hauswald, Tr. 987-88). Daramic HP is available with or without glass mat. (PX0582 at 43).

88. {

} (PX0949 at 003, *in camera*). Daramic Standard is formulated from ultra-high molecular weight polyethylene, silica and oil. (PX0582 at 43). This product offers good puncture and oxidation resistance for general use in flooded lead-acid battery applications. (PX0582 at 43). Daramic Standard is available with or without glass mat. (PX0582 at 43).

89. {

} (PX0949 at 003, *in camera*). Daramic CL is used in products in a multitude of end-use applications including traction and stationary battery applications. (Hauswald, Tr. 988; PX0582 at 50). Daramic CL is available with or without a glass mat. (PX0582 at 45).

90. {

} (PX0949 at 003, *in camera*). Daramic V is formulated from ultra-high molecular weight polyethylene, amorphous silica, oil and an additive which decreases the water loss caused by antimony deposition. (PX0582 at 45). This product is available with or without a glass mat. (PX0582 at 45).

91. {

} (PX0949 at 003, *in camera*).

92. {

}

(PX0949 at 003, *in camera*). Daramic HP is designed to reduce puncture problems caused by sharp edges on metal grids. {

} (PX0949 at 003, *in camera*).

This product is available with or without a glass mat. (PX0582-45).

93. {

}

(PX0949-004, *in camera*). Daramic HPO is designed to be used in warm weather climates. (PX0582 at 48). {

} (PX0949 at 004, *in camera*). This product is available with or without a glass mat. (PX0582 at 48).

94. {

} (PX0949 at 004, *in camera*). This product is available with or without a glass mat. (PX0582 at 49).

95. {

} (PX0949 at 004, *in camera*; Hauswald, Tr. 989). Daramic HD is formulated from ultra-high molecular weight polyethylene and is designed to minimize antimony poisoning in lead-acid batteries. (PX0582 at 46). Daramic HD is available with or without a glass mat. (PX0582 at 46).

96. {

} (PX0949 at 004, *in camera*).

97. All of the polyethylene based separators (including Daramic Standard, Daramic HP, Daramic CL, Daramic V, Daramic HP-S, Daramic HPR, Daramic HPO, Daramic Duralife, Daramic HD, Daramic W, and CellForce) perform the function of keeping the positive and negative electrodes from touching and to provide physical spacing for the electrode. Each specific product has been slightly modified to perform different functions for the end use applications where the separator is used, such as lower electrical resistance or water loss. (Whear, Tr. 4682).

98. Interchanging one PE-based battery separator product for another PE-based battery separator product would not impact the functionality of a battery, but may impact the battery's overall performance. (Whear, Tr. 4683).

(ii) DARAK Separators

99. { }

(PX0949 at 004, *in camera*; Hauswald, Tr. 989-90). DARAK separators are formulated from a modified phenolic resin and include an integrated polyester mat for reinforcement. (PX0582 at 51).

100. { } (PX0949 at 004, *in camera*). (For illustrative purposes see RX01637).

101. The DARAK product is manufactured only in Daramic's Norderstedt, Germany plant. However, on an annual basis, only one-fifth of the DARAK separators produced by Daramic are sold to customers in North America. (Hauswald, Tr. 990-91).

102. DARAK is a unique separator in that it can achieve levels of porosity up to 75 percent, while polyethylene separators typically have only a 60 percent porosity level. (Hauswald, Tr. 989-90).

103. However, seventy-five percent of the DARAK separators produced by Daramic are used in gel batteries, not flooded lead-acid batteries. (Hauswald, Tr. 990).

104. A DARAK separator can be used in both a flooded lead-acid battery and a valve regulated lead-acid battery (also known as a gel or recombination battery). (Whear, Tr. 4681).

(iii) Polyvinyl Chloride ("PVC") Separators

105. { } (PX0949 at 004, *in camera*).

(e) Microporous Products

106. {

} (PX0949 at 004, *in camera*; Hauswald, Tr. 991). (For illustrative purposes see RX01638, RX01639, and RX01640).

107. Post-acquisition, Daramic continues to manufacture and sell ACE-SIL®, FLEX-SIL® and CellForce. (PX0582 at 042; Whear, Tr. 4681).

108. {

} (Hauswald, Tr. 897-899, *in camera*; Toth, Tr. 1422-23, 1504, 1551-52, 1554-55; Graff, Tr. 4857-58; Graff, Tr. 4861, 4877, *in camera*; RX01097, *in camera*). Customers of Daramic had inquired repeatedly of Daramic representatives as to when Daramic would have a rubber separator. (Hauswald, Tr. 1059).

(i) ACE-SIL®

109. ACE-SIL® is a product which has been in production since 1935. (Gilchrist, Tr. 313-14; RX01452 at 005). { } (Whear, Tr. 4681; PX0949 at 004, *in camera*). ACE-SIL® does not contain any polyethylene. (Hauswald, Tr. 992)(For illustrative purposes see RX01638).

110. {

} (Gilchrist, Tr. 385; PX0949 at 012, *in camera*). Because of its brittleness, ACE-SIL® cannot be sleeved or enveloped. (Gilchrist, Tr. 316-17).

111. {

} (Whear, Tr. 4681; PX0949 at 004, *in camera*). ACE-SIL®is the only battery separator utilized in 20 to 25 year warranty reserve power applications. (PX0131 at 044).

112. ACE-SIL®is typically sold in cut pieces with a glass mat finish attached. (Hauswald, Tr. 992).

113. Because ACE-SIL®is composed primarily of hard rubber, it can be manufactured with a large overall thickness, while still maintaining its porosity. For this reason, ACE-SIL® is used when a thick separator is required. (Hauswald, Tr. 1006).

114. ACE-SIL® is manufactured only by Daramic, and only at Daramic's Piney Flats manufacturing facility. (Hauswald, Tr. 1006; Gilchrist, Tr. 339).

115. Microporous had no competition for its ACE-SIL® product. (PX0920 at 006, *in camera*; Gilchrist, Tr. 552-53). Piney flats is the only plant in the world making an ACE-SIL® product (Toth, Tr. 1554-55, 1556-57).

116. Because no competitor makes ACE-SIL® and no other product is used as a substitute for it, the Court finds that ACE-SIL® is a product market by itself.

(ii) FLEX-SIL®

117. {

} (PX0949 at 004, *in camera*)(For illustrative purposes see RX01639).

118. {

} (PX0949 at 004, *in camera*).

119. FLEX-SIL® is manufactured only by Daramic, and only at Daramic's Piney Flats manufacturing facility. (Hauswald, Tr. 1012). (Toth, Tr. 1554-55, 1556-57).

120. {

} (PX0949 at 012, *in camera*). In fact, FLEX-SIL® is the industry goldstandard separator in motive, deep-cycle battery applications. (Whear, Tr. 4683; PX0433 at 001 ("FLEX-SIL® is no doubt the separator of choice in today's market for golf cart battery application."); Gilchrist, Tr. 535 ; Godber, Tr. 271). Prior to the acquisition, Microporous, based on the buying patterns of customers, operated on the basis that FLEX-SIL® was the industry standard for deep-cycle applications. (Gilchrist, Tr. 535-536).

121. As a rubber-based separator FLEX-SIL® is unique in that no other battery separator product can offer the same degree of antimony suppression as FLEX-SIL®. (Whear, Tr. 4684-85). Trojan, Microporous' largest customer, considers FLEX-SIL® to be unique. (Godber, Tr. 277; RX00772, *in camera*; RX01338). U.S. Battery uses FLEX-SIL® in its premium battery line, offering a one year warranty. (Wallace, Tr. 1966-67). Over 90% of U.S. Battery separator purchases have been FLEX-SIL®. (Qureshi Tr. 2064-65). Both Trojan and U.S. Battery advertise the FLEX-SIL® separator on their websites, not Daramic HD. (Godber, Tr. 245-46, 277; (Wallace, Tr. 1963-65) (For illustrative purposes see RX01643).

122. Polyethylene is a completely inert material - it has no effect on inhibiting that antimony transfer process. (Gilchrist, Tr. 365). Rubber-based products, such as FLEX-SIL®, inhibit antimony transfer quite well. (Gilchrist, Tr. 365). For this reason, when in comes to preventing antimony transfer, batteries made with a polyethylene based separator are ultimately inferior in performance to batteries made with a rubber-based separator. (Gilchrist, Tr. 365). FLEX-SIL® test results exceed those of Daramic HD. (RX01089; Godber Tr. 172, 271; RX01093 at 2 ("Nawaz said the batteries had failed and that we didn't have anything to worry about as far as Daramic was concerned"); RX00835; RX01334; RX01329).

123. FLEX-SIL® also has very different functional capabilities than PE separators in that FLEX-SIL® cannot be enveloped. (Gilchrist, Tr. 373).

124. FLEX-SIL® is priced substantially above Daramic HD. (Wallace, Tr. 1972; Qureshi, Tr. 2064). Despite the fact that FLEX-SIL® was priced substantially higher than Daramic HD, U.S. Battery purchased FLEX-SIL® separators, comprising over 90% of its separator purchases. (Wallace Tr. 1961-62; Qureshi Tr. 2064-65.) Trojan only purchased FLEX-SIL® separators, not Daramic HD, despite the substantial price differential. (Godber Tr. 270-71).

125. Complaint Counsel called Mike Gilchrist, Microporous' former CEO, as its witness. Gilchrist testified that FLEX-SIL® had no real competition for its niche position in the battery separator market. (Gilchrist, Tr. 554; RX00780).

126. The aforementioned facts show that FLEX-SIL® is its own relevant product market. FLEX-SIL® is a niche product used in deep cycle applications and has very different, and superior, technical capabilities than polyethylene based separators.

(iii) CellForce

127. {

} (PX0949 at 005, *in camera*). (For illustrative purposes see RX01640). CellForce is manufactured as a traditional polyethylene product, except that the rubber additive (ACE-SIL® dust) is added to the product formula during the manufacturing process. (Hauswald, Tr. 993-94).

128. {

}

(PX0949 at 005, *in camera*).

(f) Other

(i) AGM

129. {

}

(PX0925 at 004, *in camera*).

130. {

} (PX0925 at 004, *in camera*). {

} (PX0925 at 004, *in camera*).

131. {

} (PX0925 at 005, *in camera*).

132. {

} (PX0925 at 006, *in camera*).

133. {

} (PX0925 at 005, *in camera*). {

} (PX0925 at 004, *in camera*).

(ii) PVC

134. { } (PX0916 at 003, *in camera*). { } (PX0916 at 003, *in camera*).

135. {

} (PX0916 at 004, *in camera*). EnerSys has purchased PVC separators for use in its industrial batteries. (Axt. Tr., 2101).

136. { } (PX0916 at 004, *in camera*).

137. {

} (PX0916 at 005, *in camera*).

138. { } (PX0916 at 005, *in camera*).

139. {

} (PX0916 at 006, *in camera*; RX01614 at 011). {

} (PX0916 at 024, *in camera*; Gillespie Tr., 2931-32, 3042, *in camera*).

(g) The Manufacturing Process

(i) PE Separators (manufactured by Daramic) and PE Separators with a Rubber Additive (manufactured by Daramic and Microporous)

140. {

} (PX0949 at 007, *in camera*). These basic ingredients are used by all polyethylene battery separator manufacturers. (Hauswald, Tr. 998).

141. The basic polyethylene manufacturing process has three stages: 1) Mixing/Extrusion, 2) Extraction, and 3) Finishing. (RX01304 at 001-006; Hauswald, Tr. 996-997; RX01641, demonstrative). This basic manufacturing process is used not only by Daramic, but by all

polyethylene battery separator manufacturers. (Hauswald, Tr. 998; Gilchrist, Tr. 593). The technology needed to construct a polyethylene manufacturing line is public knowledge. (Gilchrist, Tr. 564-66; Gaugl, Tr. 4547; Hauswald, Tr. 998).

142. During the mixing/extrusion stage, the polyethylene and the silica are linked together and oil is added to the formula mix. (Hauswald, Tr. 997). Also, during this stage, the separator's backweb thickness and ribs are created. (Hauswald, Tr. 997; RX01304 at 001). More specifically, { } (PX0949 at 007, *in camera*).

143. The second stage, extraction, is needed to add porosity to the separator. This is achieved by removing excess oil though the use of a solvent. (Hauswald, Tr. 997; RX01304 at 001). In this stage, { } (PX0949 at 007, *in camera*).

144. Finally, during the final finishing stage, the separator material is processed into cut pieces or into roll form. (Hauswald, Tr. 997-98; RX01304 at 001; RX01641 film for illustration).

145. { } (PX0949 at 008, *in camera*).

146. { } (PX0949 at 008, *in camera*).

147. {

} (PX0949 at 007, *in camera*).

148. {

}

(Hauswald, Tr. 1012-1023; RX01309, *in camera*; PX0949 at 007, *in camera*). (For illustrative purposes see RX01641).

149. The manufacturing process Daramic uses to produce polyethylene separators is the same manufacturing process used to produce CellForce and Daramic HD. In the production of CellForce and Daramic HD, an extra rubber additive is added to the component mix during the manufacturing process. (Hauswald, Tr. 1012-13).

150. Essentially, Daramic HD and CellForce are both made on a standard PE line, but in making Daramic HD, latex is added, and in making CellForce, ACE-SIL® dust is added. (Hauswald, Tr. 1013; Gilchrist, Tr. 312).

151. On any PE line, including PE lines where a rubber additive is used, after the product mix passes through the extruder, but before the product mix enters the calender roll, the product can be used in any end-use application. Said another way, the composition of the product is the same regardless of end-use application. (Hauswald, Tr. 1015-16; Gilchrist, Tr. 562; Whear, Tr. 4679; Weerts, Tr. 4493-94; *in camera*).

152. Separators are manufactured for different end uses based on the separator's thickness and rib-pattern. In the manufacturing process, as the product passes through the calender roll it receives a defined thickness and rib pattern. (Hauswald, Tr. 1016). The spacing between the top and bottom calender rolls determines the backweb thickness of a battery separator. The

grooves of a calender roll determine the height of the ribs and the overall thickness of a battery separator. (Hauswald, Tr. 1017-1019).

153. Importantly, until a polyethylene separator (or a polyethylene separator with a rubber additive) passes through the manufacturing line's calender roll, all PE separators are identical. It is the calender roll, by adding a rib pattern to the polyethylene material and creating the thickness of the material, that differentiates PE separators from one another. (Hauswald, Tr. 1012-19).

154. By changing the calender roll, the same PE manufacturing line can produce separators for different end-use applications, such as SLI or industrial. (Hauswald, Tr. 1019-20; Gilchrist, Tr. 558-60; RX01123; RX01124, *in camera* ("Both lines can run automative or industrial")).

155. As a result, one manufacturing facility can easily switch from producing one separator product to another. (Hauswald, Tr. 1012-19).

156. A calender roll can be substituted into the manufacturing line in place of another calender roll in approximately twenty minutes. (Hauswald, Tr. 1019). (For illustrative purposes see RX01641). Moreover, {

} (Weerts, Tr. 4493-4494, *in camera*).

157. {

} (Hauswald, Tr. 1024; Gilchrist, Tr. 559, Weerts, Tr. 4488-4489, *in camera*; Gaugl, Tr. 4553; RX00146 at 002-003, *in camera*).

158. It takes a calender roll vendor anywhere from 2 days to 5 weeks to make and sell a new calender roll. (Gilchrist, Tr. 569).

159. Moreover, all of the equipment necessary for the construction of a polyethylene line - including extruders, extractors, ovens, dryers, and calender stacks - can be purchased "off-the-

shelf" from various third-party vendors. (Hauswald, Tr. 1025-29; RX01300; RX01219; RX01220; RX01221; RX01222; RX01223; RX01224; RX01046, *in camera*; RX01030; RX01031; RX01040, *in camera*). For example, all of the equipment necessary for the polyethylene lines in the Feistritz, Austria facility was procured from third-party vendors. (Hauswald, Tr. 1102-04; RX01046, *in camera*). {

}

(Weerts, Tr. 4498-99, *in camera*)

(ii) Rubber Separators

160. {

} (PX0949 at 008, *in camera*; RX01310 at 001; Hauswald, Tr. 999-1006). (For illustrative purposes see RX01641).

161. FLEX-SIL® battery separators are produced from a blend of natural rubber, precipitated silica, and water. After mixing these ingredients, the material is extruded in sheet form to a calender stack that forms a customer specific rib design. The rib design is created as the product passes through the calender roll. The calendered sheet is then cured or cross linked by irradiation from an electron beam accelerator system. The sheet is then dried to remove most of

the water introduced during the initial mixing process. This water removal forms the basis for the porous structure required for the battery separator to function properly in a battery. (Hauswald, Tr. 1006-1012; RX01311 at 001; PX0949 at 008, *in camera*)(For illustrative purposes see RX01641).

162. FLEX-SIL® battery separators are produced using the same ingredients and through the same manufacturing process as ACE-SIL® battery separators, with the exception that sulfur is not used in the process, but instead an electron beam is used to cross-link the FLEX-SIL® product (Hauswald, Tr. 1006, 1008-09).

(iii) Phenolic Resin Separators (manufactured by Daramic)

163. {

} (PX0949 at 009, *in camera*).

(iv) Polyvinyl Chloride Separators (manufactured by Daramic)

164. {

} (PX0949 at 010, *in camera*).

(h) The Production Lines

165. {

} (PX0950 at 038, *in camera*).

166. {

} (PX0950 at 039, *in camera*; Gaugl, Tr. 4545).

167. {

} (PX0950 at 039, *in camera*; Hauswald, Tr. 961-962; Gaugl, Tr. 4566).

168. {

} (PX0950 at 039, *in camera*).

169. {

} (PX0950 at 040, *in camera*; Gaugl, Tr. 4545).

170. {

} (PX0950 at 040, *in camera*).

171. {

} (PX0950 at 040, *in camera*).

172. {

} (PX0950 at 041, *in camera*).

173. {

} (PX0950 at 041, *in camera*).

174. {

} (PX0950 at 041, *in camera*).

175. {

} (PX0950 at 041-042, *in camera*).

176. {

} (PX0950 at 038-039, *in camera*; RX01026, *in camera*).

177. There are no patents, intellectual property, or other technological barriers to installing this equipment and building a PE battery separator production line. (PX0950 at 42, *in camera*; Toth, Tr. 1626, Gaugl, Tr. 4547).

178. The same production lines can be used to manufacture different types of polyethylene separators, including those with or without a rubber additive. (Hauswald, Tr. 1012-13; Gaugl, Tr. 4551; PX0949 at 011, *in camera*).

179. The same production line can manufacture polyethylene-based separators for automotive and industrial applications. (Hauswald, Tr. 1019-20; Gilchrist, Tr. 558-60; Gaugl, Tr. 4552-53; PX0949-011, *in camera*).

180. {

} (Weerts, Tr. 4493-4494; Hauswald, Tr. 1019; Gaugl, Tr. 4551; PX0949 at 011, *in camera*).

181. {

} (PX0949 at 012, *in camera*; Hauswald, Tr. 993-94, 1000, 1006, 1008, 1012, 1020-21).

182. {

} (PX0949 at 012, *in camera*).

183. {

} (PX0949 at 012, *in camera*).

184. {

} (PX0949 at 012, *in camera*).

185. {

} (PX0949 at 012, *in camera*).

C. The Relevant Geographic Market of the Industry

a. Battery Separator Manufacturers Operate in a Global Market

186. {

} (Hauswald, Tr. 858-59, *in camera*; PX0522 at 11-18, *in camera*; RX01073, *in camera*; RX01409, *in camera*; RX00620, *in camera*; RX01001, *in camera*; RX01002; RX01004, *in camera*; RX01074, *in camera*; RX01075, *in camera*; RX01084, *in camera*; RX01085, *in camera*; RX01086, *in camera*; RX01087; RX01088; RX01179, *in camera*; RX01409, *in camera*).

187. {

} (RX00677, *in camera*; RX01084, *in camera*). Daramic has sales teams and technical service teams located all over the world. (Seibert, Tr. 4143-44).

188. { }

(RX0119, *in camera*; RX01407, *in camera*). {

} (RX01076, *in camera*; RX01077, *in camera*) {

} (Thuet, Tr. at 4351, *in camera*; RX01076, *in camera*; RX01077, *in camera*; RX01080 at 40, 43, 46, *in camera*); RX01178, *in camera*; RX01179, *in camera*; RX01180, *in camera*. {

} (Thuet, Tr. at 4351, *in camera*).

189. {

} (Seibert, Tr. 4152-53, *in camera*; RX01073, *in camera*; RX01409, *in camera*; RX01074; RX01085, *in camera*; RX01086, *in camera*;

RX01087, *in camera*). {

} (Seibert, Tr. 4152-54, *in camera*). {

} (Seibert, Tr. 4153, *in camera*).

190. {

} (Seibert, Tr. 4175-76, *in camera*; RX01065 at 7; RX01069; RX01070, *in camera*; RX01071; RX01022, *in camera*; RX01339 at 7; RX01349, *in camera*). In fact, the competition from Asian manufacturers is increasing all over the world, not solely in Asia. (Thuet, Tr. 4339).

191. Prior to the acquisition, Microporous considered its CellForce separator to be a "world leader product." (Gilchrist, Tr. 339). Additionally, Microporous sold and shipped separators from its facility in Piney Flats, Tennessee to customers around the world, including locations in the U.S., Mexico, South America, Europe, Asia and Africa. (McDonald, Tr. 3790-91; Gilchrist, Tr. 540-41).

192. Before being acquired, Microporous exported a large portion of its separators from North America. (McDonald, Tr. 3790-91). In fact, prior to the acquisition, Microporous exported 60% to 70% of its CellForce product. (Gaugl, Tr. 4555) {

} (Thuet, Tr. at 4352, *in camera*) {

} (Thuet Tr. at 4353, *in camera*). {

} (Hall, Tr. 2846-47, 2880, *in camera*). {

} (Hall, Tr. 2894, *in camera*). {

} Thuet, Tr. 4434; RX00677, *in camera*).

193. {

} (Weerts, Tr. 4467-68, *in camera*).

{

} (Weerts, Tr. 4467-68, *in camera*).

194. {

} (Weerts, Tr. 4465-67, *in camera*; RX01530 at 003, *in camera*; RX01512). {

} (Weerts, Tr. 4465-67, *in camera*). {

} (Weerts, Tr. 4465-66, *in camera;* RX00117, *in camera*). {

} (Weerts, Tr. 4466-67, *in camera;* RX00119, *in camera*; RX00120, *in camera*; RX00121, *in camera*; RX00122, *in camera*). {

} (RX00259, *in camera*; RX00260, *in camera*).

195. In 2008, { } its North American facility. (PX1833 *in camera*). In 2007, {

} (PX1833, *in camera*).

196. {

} (Weerts, Tr. 4464-65, *in camera*). {

} (Weerts, Tr. 4464-65, *in camera*).

197. {

} (Weerts, Tr. 4469, *in camera*).

198. { }

(Weerts, Tr. 4469, *in camera*). { } (Weerts, Tr. 4472, *in camera*). {

} (Weerts, Tr. 4474-75, *in camera*).

199. Due to the excess capacity, Asian separator manufacturers are exporting products to other parts of the world. (Thuet, Tr. 4339-40). For example, Daramic is exporting separators to Europe, the Middle East and South America. (Thuet, Tr. 4339). NSG, Anpei and Epoch are also exporting to Europe and South America. (Thuet, Tr. 4339-40; RX00050, *in camera*). {

} (Seibert, Tr. 4165, *in camera*).

200. Asian separator companies have grown substantially in the past years and are competitive with Daramic. (Seibert, Tr. at 4149; Thuet, Tr. at 4330; RX00032, *in camera*). Anpei, Separindo, Baotou, Sebang, Epoch are all PE separator companies in Asia competing with Daramic for business including in South America. (Hauswald, Tr. 862-63, *in camera*, 866-867, *in camera*; Hauswald, Tr. 1030, 1034, 1036-37, 1107-11; Seibert, Tr. 4159-66, 4176-77, *in camera*; Thuet, Tr. 4331-4333, 4335-36, 4339-40; RX01342; PX0184; RX00551 at 3-4, *in camera*; RX01447, *in camera*; RX01448, *in camera;* RX01064; RX01067; RX01125; RX01447, *in camera*; RX01558, *in camera*; RX01085, *in camera*; RX01409, *in camera*; RX00586, *in camera*; RX01600, *in camera*; RX00587-04, *in camera*; RX00555, *in camera*; RX00553, *in camera*; RX00550, *in camera*). Daramic considered the quality of Anpei, BFR and Baotou's

product sufficient that it made an offer to purchase each of those companies. (Hauswald, Tr. 1109).

201. Asian separator manufacturers have also sought to sell PE separators to customers located in North America.

a. East Penn obtained a quote for the sale of PE separators from Anpei. (Leister, Tr. 3992). East Penn also obtained PE samples from Anpei. (Leister, Tr. 3992; RX00079).

b. { } (Hall, Tr. 2862, *in camera*; RX00037-03). { }, *in camera*; RX00043-03,05, *in camera*; RX00048-02 { }, *in camera*; RX00066-07, *in camera*; RX00074-06, *in camera.*)

c. { } (Burkert, Tr. at 2360-61, *in camera*; RX00023; RX00193; RX00198; RX00199, *in camera*; RX00203, *in camera*; RX00204; RX00225; RX00237; RX00239, *in camera*).

d. { } (Burkert, Tr. at 2450, *in camera*; RX00223).

e. { } (RX00303, *in camera*, RX00304; RX00305; RX00306; RX00307).

202. { } (RX00095, *in camera).*

b. <u>Battery Manufacturers Also Conduct Their Business in a Global Market</u>

203. JCI is the largest manufacturer of automotive batteries in the world, and it procures separators on a global basis. (Hall, Tr. 2662-64). Rodger Hall of JCI is the Global Vice President for Procurement. (Hall, Tr. 2662). In that position, he is responsible for global procurement of all materials purchased by JCI, including PE separators. (Hall, Tr. 2663-64). In addition, Mr. Hall is in charge of JCI's "global separator strategies." (Hall, Tr. 2664).

204. JCI has numerous plants located throughout the world, including the U.S., Mexico, Brazil, Europe and Asia. (Hall, Tr. 2794-95). { } (Hall, Tr. 2865, *in camera*; PX1505, *in camera*) { } (RX00036, *in camera*; RX00039, *in camera*; RX00075, *in camera*; RX00065, *in camera*; RX00057, *in camera*; RX00070-03, *in camera*).

205. { } (RX00072, *in camera*).

206. { } (Hall, Tr. 2715-16; PX0907 (Kung, Dep. at 59); RX00053, *in camera*; RX00032, *in camera*). As part of its joint venture agreement with BFR, JCI contemplated BFR supplying it with separator on a global supply basis. (RX01602). (*See also* RX00051 ("Strategic vision for expanding BFR market outside of China/Asia"); RX00054 at 02 { }, *in camera*; RX00055, ("We can work together to make BFR a world class separator supplier to JCI and other battery manufacturers"); Hall Tr. 2860).

207. { } (RX00065 at 011-13, *in camera*).

208. EnerSys is the largest manufacturer of industrial batteries in the world, and it procures separators on a global basis. (Axt, Tr. 2228; RX00236; RX01203, *in camera*). Larry Axt of EnerSys is responsible for "global procurement" of all raw materials and finished goods, as well as indirect material and capital equipment. (Axt, Tr. 2097-98). Furthermore, Larry Burkert of EnerSys is in charge of "global procurement" of separators. (Burkert, Tr. 2369).

209. EnerSys has more than 20 plants worldwide. (Axt, Tr. 2226). EnerSys manufactures batteries in Mexico, China and Europe which are shipped to and sold in the U.S. (Axt, Tr. 2228-29). Because of its size and numerous facilities throughout the world, EnerSys manages its business strategy on a global basis. (Axt, Tr. 2239). EnerSys maintains global strategies for its policies and procedures concerning quality assurance. (Gagge, Tr. 2542).

210. Exide ranks as the first or second largest battery manufacturer in the world, depending on the specific area. (Gillespie, Tr. 2930). Exide is a "global participant in the global marketplace." (Gillespie, Tr. 3093).

211. Douglas Gillespie of Exide is the Vice President of Global Procurement, and he is responsible for the procurement of materials around the world. (Gillespie, Tr. 2926, 2928). {

} (Bregman, Tr. 2898-99, *in camera*).

212. {

} (Bregman, Tr. 2898-99, *in camera*; RX00144, *in camera*; RX00300, RX00301, *in camera*; RX00302; RX00303, *in camera*; RX00304; RX00305; RX00306, *in camera*). { } (Gillespie, Tr. 3026, *in camera*). {

} (Gillespie, Tr. 3060, *in camera*).

213. Exide conducted a global search for automotive battery separator manufacturers. (Gillespie, Tr. 2962-63; RX00144, *in camera*; RX00300, RX00301, *in camera*; RX00302; RX00303, *in camera*; RX00304; RX00305; RX00306, *in camera*; RX00362). In conducting the search, Exide visited various separator manufacturers around the world, hired a third party to identify separator manufacturers in the Asia-Pacific region, and sent a Request for Proposal

("RFP") to "the top separator manufacturers around the globe." (Gillespie, Tr. 2962-63). Through the RFP, Exide provided its global PE separator requirements to numerous separator manufacturers. (Gillespie, Tr. 2965, 2967; RX00144, *in camera*; RX00145, *in camera*; RX00339 at 17, *in camera*; RX00338). {

} (RX00147, *in camera*).

214. Exide is working to standardize the specifications for its separators used around the world. (Gillespie, Tr. 3093).

215. East Penn is a lead acid battery and wire and cable manufacturing company headquartered in Lyon Station, Pennsylvania. (Leister, Tr. at 3968). East Penn has manufacturing facilities located in Lyon Station, and Corydon, Iowa with annual sales of approximately $1.25 billion. (Leister, Tr. at 3968). East Penn also has a battery manufacturing facility in Asia, with three automotive plants, one motive power plant, and one stationary plant. (Leister, Tr. at 3969).

216. East Penn sells its batteries manufactured out of its Lyon Station facility outside of North America. (Leister, Tr. 3969-70).

217. East Penn purchases its PE separators for its global operations from Daramic and Entek, approximately 70% and 30%, respectively. (Leister, Tr. at 3984). East Penn has obtained a quote and samples from Anpei. (Leister, Tr. at 3992).

218. Trojan is the largest manufacturer of golf cart batteries in the world. (Godber, Tr. 274). It has two manufacturing plants, one located in California and the other in Georgia. (Godber, Tr. 253). {

} (Godber, Tr. 252-53, *in camera*).

219. Trojan sells approximately 60% of its batteries to the after-market. (Godber, Tr. 144). Of those after-market sales, 35-38% of Trojan's sales are domestic, while 62-65% of its sales are international. (Godber, Tr. 144).

220. Trojan acquires AGM battery separators from China and uses those separators primarily in its marine line. (Godber, Tr. 148). Trojan's product sales and purchases of component parts indicate that it is involved in activity throughout the global marketplace.

221. Trojan competes for customers with US Battery, Exide, Crown Battery, East Penn Battery, Surette, a Canadian company, Johnson Controls, Global and YUASA. (Godber, Tr. 145). Global and YUASA are Asian battery manufacturers. (Godber, Tr. 145; Thuet, Tr. 4336-37.)

222. U.S. Battery holds itself out to the world as the leading manufacturer of deep-cycle batteries. (Wallace, Tr. 1955). U.S. Battery sells and ships batteries to more than 60 countries around the world from its plants in Corona, California and Augusta, Georgia. (Wallace, Tr. 1957-58).

223. Based on the findings above, the Court finds that battery separator manufacturers and battery manufacturers operate in a global market and, therefore, the valid and proper relevant market is worldwide.

IV. The Parties

A. Polypore/Daramic

a. Before the Acquisition

224. Polypore International, Inc. ("Polypore") is a global filtration company that specializes in the manufacturing of microporous membranes for use in separation and filtration processes. (PX2160 at 006).

225. Polypore is a Delaware corporation with headquarters in Charlotte, North Carolina. (PX2160 at 006). Polypore operates a global business and has a presence in North America, Asia, Western Europe, and South America. (PX2160 at 055).

226. Polypore is a publicly traded company which was previously owned by Warburg Pincus, a private equity firm. (Hauswald, Tr. 965; PX2160 at 060). Polypore went public in the summer of 2007. (Toth, Tr. 1424). {

} (Toth, Tr. 1599, *in camera*). In fact, Michael Graff, a partner and managing director of Warburg Pincus, has served as the Chairman of Polypore's Board of Directors since Warburg acquired Polypore in May 2004. (Graff, Tr. 4849-50).

227. Polypore consists of four separate business divisions: 1) Liqui-Cel, 2) Membrana, 3) Celgard, and 4) Daramic. (Toth, Tr. 1498-99; PX0194; RX00635). Liqui-Cel manufactures specialty filtration products for liquid degasification and water purification. (RX00635 at 007). Membrana produces microporous membranes for medical applications such as hemodialysis, blood oxygenation and plasma separation. (Toth, Tr. 1498-99; RX00635 at 006). Celgard manufactures battery separators for high-performance lithium-ion batteries. (Toth, Tr. 1498-99; RX00635 at 008). Daramic, which is part of Polypore's energy storage segment, produces microporous separators for the flooded lead-acid battery industry. (Toth, Tr. 1385; Hauswald, Tr. 965-66; RX00635 at 009).

228. Polypore has been led by its President and CEO, Robert Toth, since July 2005. (Toth, Tr. 1385). Toth has an extensive business background and a thorough understanding of the business at each of Polypore's four divisions. (Toth, Tr. 1500). He obtained a bachelor's degree in industrial science from Purdue University and a master's degree in engineering from Washington University in St. Louis. (Toth, Tr. 1490). Toth began his career at Monsanto Company and its