UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF PENNSYLVANIA

RESCO PRODUCTS, INC., **Plaintiff,** **v.** **BOSAI MINERALS GROUP CO., LTD., and CMP TIANJIN CO., LTD.,** **Defendants.**	**Civil Action No.: 2:06-cv-235-JFC** **Honorable Joy Flowers Conti**

DECLARATION OF AUGUST T. HORVATH IN SUPPORT OF PLAINTIFF'S OPPOSITION TO DEFENDANTS' MOTION TO EXCLUDE TESTIMONY AND REPORTS OF DR. RUSSELL LAMB

I, August T. Horvath, declare as follows:

1. I am a member of the law firm of Kelley Drye & Warren LLP, co-counsel to Plaintiffs in the above-captioned matter, for which I am admitted *pro hac vice*.

2. I submit this declaration in support of Plaintiff's Memorandum of Law in Opposition to Defendants' Motion to Exclude Testimony and Reports of Dr. Russell Lamb.

3. Attached hereto as Exhibit A is a true and correct copy of Dr. Russell L. Lamb's Expert Report Concerning Damages, dated September 29, 2014.

4. Attached hereto as Exhibit B is a true and correct copy of Dr. Russell L. Lamb's Supplement Expert Report Concerning Damages, dated December 15, 2015.

5. Attached hereto as Exhibit C is a true and correct copy of excerpts from the deposition of Dr. Russell L. Lamb, taken on February 13, 2015.

6. Attached hereto as Exhibit D is a true and correct copy of the Expert Report of Frederick R. Warren-Boulton Concerning Liability, dated November 13, 2014.

7. Attached hereto as Exhibit E is a true and correct copy of excerpts from the deposition of Dr. Frederick R. Warren-Boulton, taken on February 24, 2015.

8. Attached hereto as Exhibit F is a true and correct copy of excerpts from the deposition of Haijian Liu, taken on April 23, 2014.

9. Attached hereto as Exhibit G is a true and correct copy of excerpts from the deposition of Laura Liang, taken on April 18, 2014.

10. Attached hereto as Exhibit H is a true and correct copy of the China Chamber of Commerce for the Minerals and Chemical Importers and Exporters Bauxite Branch Rules of Procedure.

11. Attached hereto as Exhibit I is a true and correct copy of Minutes of the Enlarged Council Meeting of the Bauxite Branch, held on November 19, 2004.

12. Attached hereto as Exhibit J is a true and correct copy of Minutes of the Enlarged Council Meeting of the Bauxite Branch, held on September 15, 2006.

13. Attached hereto as Exhibit K is a true and correct copy of Minutes of the Enlarged Council Meeting of the Bauxite Branch, held on September 18, 2007.

14. Attached hereto as Exhibit L is a true and correct copy of an email from Haijian Liu, dated October 27, 2015.

I declare under the penalty of perjury that the foregoing is true and correct.

Dated: March 31, 2015

August T. Horvath

Exhibit A

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF PENNSYLVANIA

RESCO PRODUCTS, INC., Plaintiff, v. BOSAI MINERALS GROUP CO., LTD, CMP TIANJIN CO., LTD Defendants.	Civil Action No.: 2:06-cv-325-JFC

EXPERT REPORT CONCERNING DAMAGES

Dr. Russell L. Lamb
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Nathan Associates Inc.
2101 Wilson Boulevard
Suite 1200
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September 29, 2014

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I. Introduction and Summary of Conclusions

A. Expert background and qualifications

1. I am a Senior Vice President at Nathan Associates Inc. ("Nathan Associates") where I direct the litigation activities in the Arlington, VA office. Nathan Associates is a business and economic consulting firm that provides economic research and analysis to clients in the U.S. and internationally and maintains offices in Arlington, VA; Irvine, CA; London, England and Chennai, India. I have studied the economics of markets and prices for more than 25 years and have consulted on these issues for over 20 years. I previously have been asked to opine on a variety of economic issues, including the existence of cartel behavior in various markets, damages arising from anti-competitive conduct, and class-wide impact arising from alleged price-fixing and anticompetitive conduct as well as class-wide injury arising from allegations of consumer fraud or breach of warranty. I have also been retained to offer opinions regarding liability and damages issues in antitrust matters. A copy of my C.V., including a list of the matters in which I have submitted expert testimony in the past four years, is attached to this report as Appendix A.

2. I graduated from the University of Tennessee, Knoxville in 1987 (summa cum laude, Phi Beta Kappa) as the top graduate in my class. I earned a Master's degree in economics from the University of Maryland in 1989 and received a Ph.D. in economics from the University of Pennsylvania in 1994. My economic research has been published in peer-reviewed journals such as the *Journal of Econometrics*, *Journal of Development Economics*, *CATO Journal*, *Regulation* and others. I have also served as a referee for leading economics journals including the *International Economic Review*, *Journal of Business and Economic Statistics*, *American Journal of Agricultural Economics* and *Contemporary Economic Policy*.

3. Prior to my employment at Nathan Associates, I held a variety of positions in government, academia, and other consulting firms. From 1994 until 1999 I was an Economist (later Senior Economist) with the Federal Reserve System of the U.S. in Washington, DC and Kansas City, MO. From 1999 until 2004 I taught economics and agricultural economics at North Carolina State University in Raleigh, NC. I have also been hired as an economic consultant to the World Bank and the Government of Peru, in addition to being retained on a wide range of economic consulting projects in a variety of contexts. In addition to my consulting activities, I teach

economics at the George Washington University, where I am an adjunct faculty member in the Department of Economics. Nathan Associates is being compensated for my work in this matter at my hourly rate of $550 per hour. Nathan Associates' compensation in this matter is not contingent upon the content of my testimony or the outcome of this litigation.

B. Summary of plaintiff's allegations

4. I understand that the allegations in this matter involve the manipulation by defendants of the market and the price for refractory grade bauxite products beginning as early as January 1, 2003 and continuing until 2009.[1] I discuss these allegations in further detail in my report below. I have been retained by counsel for the plaintiff in this matter to determine class-wide damages. In the remainder of my report I assume that the allegations contained in the complaint are in fact true. That is, I assume that the defendants engaged in a conspiracy to fix prices and restrain supply of refractory grade bauxite products in the U.S. during the class period.

5. I understand that for purposes of determining damages the class has been proposed as follows:

> All persons or entities who directly purchased refractory grade bauxite products for delivery or use in the U.S. from any of the defendants or their co-conspirators from January 1, 2003 to the date that the cartel is ended by an injunction or otherwise (the "damages" class). Excluded from [the class] are all governmental entities, defendants, their co-conspirators, and their respective subsidiaries and affiliates.[2]

6. In preparing this report I have relied upon numerous publicly available documents and manuscripts that describe various aspects of the production of and market for refractory grade bauxite products. A list of the documents that I have reviewed is contained in Appendix B to this report.

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[1] In the United States District Court for the Western District of Pennsylvania, Resco Products, Inc v. Bosai Minerals Group Co. Ltd., et al, "First Amended Class Action Complaint," July 17, 2009 (hereafter "Complaint") at ¶2. Laura Liang, deputy manager of bauxite exporting department of Bosai, testified that Bosai's bauxite exporting department ceased to exist after 2009. Deposition of Laura Liang, April 18, 2014, p. 14.

[2] Complaint at ¶¶18-19.

7. In preparing this report I have performed a multiple regression analysis using the transaction data provided by the defendants. My multiple regression analysis, which is common to the class as a whole, is capable of showing that the prices of Chinese refractory bauxite cannot be explained solely by market factors. Based upon my analysis of the market for bauxite as well as my multiple regression analysis, I have determined that all class members were injured as a result of the defendants' alleged misconduct, in that they paid more for refractory grade bauxite products than they would have paid but for the defendants' alleged misconduct. I have estimated damages owed to class members for their total imports to be $27.47 million before trebling. I have also estimated damages that are attributable to the two defendants, Bosai and CMP, to be $2.46 million and $2.19 million, respectively, before trebling.

II. Industry Background

A. Metallurgical and non-metallurgical bauxite

8. Bauxite is a mineral used for both metallurgical and non-metallurgical applications. Metallurgical applications of bauxite are nearly synonymous with aluminum production, whereas non-metallurgical applications employ bauxite as an input in the manufacturing of refractories, Portland cement, and aluminum chemicals, among other uses.[3] As discussed below, the ultimate use of bauxite is determined by chemical properties present "in the ground" rather than by how it is further processed, so metallurgical grade bauxite cannot be converted into non-metallurgical grade by processing. Demand for non-metallurgical grade bauxite is small relative to metallurgical uses, accounting for roughly five percent of U.S. demand in 2002.[4] Refractory grade bauxite is a type of non-metallurgical grade bauxite and is used primarily in iron and steel mill furnaces. Virtually no refractory grade bauxite is produced domestically and nearly all

[3] Discussed in more detail below, a refractory is a material that retains its shape and chemical identity at high temperatures and in the presence of molten metal, glass, slag, and hot gas and is often used in kilns, furnaces, boilers, incinerators, and other applications. U.S. Environmental Protection Agency, *Economic Impact Analysis of the Refractory Product Manufacturing NESHAP – Final Rule*, http://yosemite1.epa.gov/EE/EPA/ria.nsf/EIO/7B393B16BFC7532985256D11004DEFD5, p. 1-1.

[4] Roskill Information Services Ltd., *The Economics of Bauxite and Alumina*, Sixth Edition, 2005, p. 2 and U.S. Geological Survey, Bauxite statistics, in Kelly, T.D., and Matos, G.R., comps., Historical statistics for mineral and material commodities in the United States: U.S. Geological Survey Data Series 140, available online at http://pubs.usgs.gov/ds/2005/140/.

consumed in the U.S. is imported from three countries: China, Guyana, and Brazil.[5] Between 2002 and 2008, China was the largest supplier, accounting for roughly half of all U.S. imports.[6]

9. Bauxite is composed of the hydrated aluminum oxides boehmite, diaspore, and gibbsite and may also contain silica, iron oxide, titania, aluminosilicates such as clay, and other impurities in small amounts.[7] Both between and within deposits, the aluminum oxides vary in ratio, resulting in different physical properties, structures, and textures.[8] Bauxite is typically found in tropical climates where wet and dry seasons alternate.[9]

10. Metallurgical bauxite is, by definition, converted to alumina by what is known as the Bayer process and is typically then refined to aluminum metal.[10] Bauxite is the only commercial ore of aluminum and is used overwhelmingly in metallurgical applications.[11] For example, in 2006, metallurgical bauxite represented 96 percent of the 12.3 million metric tons of bauxite consumed in the U.S., and 87 percent of this amount became aluminum metal.[12] Metallurgical bauxite not refined to aluminum metal, and non-metallurgical bauxite, are used to produce end products for industrial uses such as abrasives, chemicals, and refractories.[13] Since non-metallurgical bauxite is often roasted or fired, it is also referred to as "calcined" bauxite. The process of "calcinations" consumes large quantities of energy. Table 1 compares U.S. consumption of various grades of bauxite to world production on an annual basis for the years 1998 to 2009.[14]

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[5] Kogel et al., pp. 242-244.
[6] This share is based on U.S. import information for refractory grade bauxite from 2002 to 2010. U.S. Geological Survey, Minerals Yearbook, Bauxite and Alumina, 2003-2010.
[7] Roskill Information Services Ltd., p. 2 and Kogel et al., p. 227.
[8] Kogel et al., p. 232.
[9] Roskill Information Services Ltd., p. 7 and Kogel et al., p. 229.
[10] Kogel et al., pp. 227 and 238.
[11] Roskill Information Services Ltd., p. 7.
[12] U.S. Geological Survey, 2006 Minerals Yearbook: Bauxite and Alumina, p. 10.7.
[13] Non-metallurgical bauxite can also be converted to brown fused alumina, approximately 40-50 percent of which is used to make refractories. Roskill Information Services Ltd., pp. 2 and 12 and Kogel et al., p. 242. According to the Mineral Information Institute, about 85% of all the bauxite mined worldwide is used to produce alumina for refining into aluminum metal. Another 10% produces alumina which is used in chemical, abrasive, and refractory products. The remaining 5% of bauxite is used to make abrasives, refractory materials, and aluminum compounds. "Aluminum & Bauxite," Mineral Information Institute, http://www.mii.org/Minerals/photoal.html.
[14] Although alumina is used primarily in metallurgical processes, a small percentage is sometimes used in non-metallurgical applications. For example, in 2006, 87% of alumina was shipped to "aluminum smelters for metal production" while the remaining 13% was used in non-metallurgical processes. See U.S. Geological Survey, 2006 Minerals Yearbook: Bauxite and Alumina, p. 10.1.

Table 1. U.S. consumption of bauxite by selected grades

(Thousands of metric tons)

Year	World production	U.S. consumption, metallurgical and non-metallurgical grade	U.S. consumption, non-metallurgical grade	U.S. consumption, alumina for non-metallurgical processes (converted to thousand metric tons of bauxite)	U.S. consumption, refractory-grade
1998	123,000	12,700	2,102	1,693	213
1999	129,000	11,700	1,413	1,042	140
2000	136,000	10,800	2,170	1,692	177
2001	137,000	9,770	1,791	1,253	81
2002	144,000	9,980	1,738	1,231	103
2003	153,000	11,300	1,819	1,231	79
2004	164,000	13,600	1,881	1,039	158
2005	178,000	12,400	1,689	1,189	221
2006	193,000	12,300	2,065	1,565	228
2007	221,000	10,200	1,612	1,242	278
2008	224,000	9,550	1,001	767	361
2009	210,000	5,490	1,114	961	202

Source: U.S. Geological Survey, Bauxite Statistics, in Kelly, T.D., and Matos, G.R., comps., Historical statistics for mineral and material commodities in the U.S.: U.S. Geological Survey Data Series 140, available online at http://minerals.usgs.gov/minerals/pubs/historical-statistics/; and U.S. Geological Survey, Minerals Yearbook, Bauxite and Alumina, 1998-2010. [15]

B. Refractory grade bauxite is the largest non-metallurgical market excluding alumina

11. Bauxite used in production of refractories accounts for the largest category of non-metallurgical bauxite, after alumina is excluded.[16] A refractory is a material that maintains it shape and chemical identity at high temperatures and in the presence of molten metal, glass, slag, or hot gas. It is often used in kilns, furnaces, boilers, and incinerators where temperatures exceed 538°C (1000°F) and is classified as acidic or basic, depending upon its chemical composition.[17]

[15] Alumina used by the abrasives, chemicals, refractories, and specialties industries accounted for a small percentage of U.S. consumption for non-metallurgical processes. To convert this amount to a bauxite equivalent amount, I multiplied the amount of alumina consumed for non-metallurgical processes by 2.25, since 2.25 tons of bauxite is used to produce one ton of alumina.

[16] Markets for non-metallurgical bauxite in the production of aluminum chemicals, such as aluminum sulphate for water treatment use, and of proppant, which helps to keep fractures in rock formations and is used in gas and oil drilling, are much smaller. Roskill Information Services Ltd., pp. 4-5 and Kogel et al., p. 240.

[17] U.S. Environmental Protection Agency, pp. 1-1 and 2-12; Kogel et al., pp. 239-240 and Roskill Information Services Ltd., p. 199.

Refractories made from non-metallurgical bauxite are considered acidic due to their alumina content.[18]

12. The U.S. consumes refractory grade bauxite in production of iron and steel, non-ferrous metal, and cement and lime manufacturing, as well as for use in glass manufacturing and oil refining.[19] Of these, the iron and steel industry is the largest, representing about 62 percent of refractory use; the second largest market is non-ferrous metal manufacturing and accounts for 11 percent of consumption.[20] Steel industry refractories are used to create teeming ladles and also to line coke ovens, blast furnaces, blast furnace stoves, basic oxygen vessels, electric furnaces, open-hearth furnaces, and other heat-related manufacturing equipment.[21]

13. There are no direct substitutes for refractories and few for those made from refractory grade bauxite, particularly in the U.S. In applications not requiring extreme temperatures, medium-alumina content bauxite-based refractories can be replaced by synthetic mullite which is produced from kyanite and sillimanite.[22] The U.S., however, has been slow to adopt these alternatives.[23]

C. Refractory grade bauxite differs from metallurgical bauxite in both composition and production

14. Regardless of whether they are metallurgical or non-metallurgical grade, almost all bauxite deposits are mined by surface or open cast methods.[24] A single deposit is generally only suited for one application due to variability in chemical composition. For example, deposits used for non-metallurgical applications must meet stricter specifications than those used for metallurgical purposes. Natural impurities in the ore are not chemically removed during

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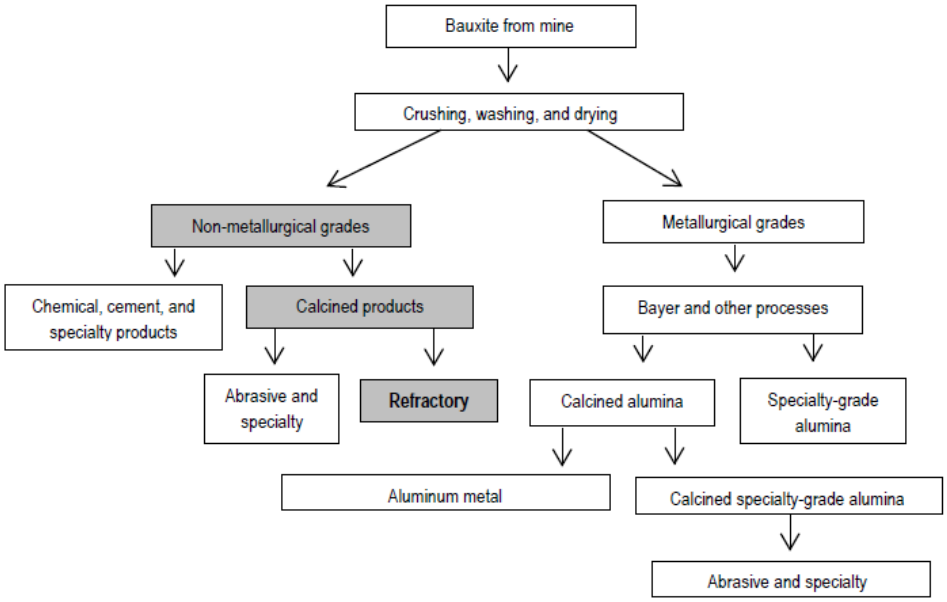
[18] Roskill Information Services Ltd., pp. 199-200.
[19] Kogel et al., p. 244. According to a source cited by the U.S. Environmental Protection Agency, the steel industry uses 50 to 80 percent of all refractories produced. U.S. Environmental Protection Agency, pp. 2-34 and 4-3; Roskill Information Services Ltd., pp. 232-233.
[20] Roskill Information Services Ltd., p. 226 and U.S. Environmental Protection Agency, p. 2-29. Alternative sources cited by the U.S. Environmental Protection Agency have listed the iron and steel industry as representing 50 to 75 percent of refractory demand. U.S. Environmental Protection Agency, p. 4-3.
[21] U.S. Environmental Protection Agency, p. 2-34 and National Development Strategy, Chapter 12: The External Sector and Monetary Management, August 7, 1996. http://www.guyana.org/NDS/chap12.htm, p. 19.
[22] Kogel et al., p. 240 Table 7 and p. 242.
[23] National Development Strategy, Chapter 12: The External Sector and Monetary Management, August 7, 1996. http://www.guyana.org/NDS/chap12.htm.
[24] Roskill Information Services Ltd., p. 2 and Kogel et al., pp. 236-237.

processing as they are with metallurgical bauxite, requiring "purer" deposits.[25] Refractory grade bauxite requires more alumina to resist high temperature increases.[26] Therefore, the amount of reactive silica present is crucial as it reduces the amount of available alumina.

15. Generally, prior to calcination, crude refractory grade bauxite is 59 to 61 percent aluminum oxide, whereas metallurgical grade bauxite can have as little as 32 percent.[27] Non-metallurgical bauxite often necessitates additional processing, such as jigging or heavy media separation, to decrease iron content or eliminate calcareous impurities.[28] Due to its higher aluminum oxide content, relative scarcity, and processing costs, refractory grade bauxite sells at a premium compared with metallurgical bauxite.[29] Figure 1 illustrates the basic production and classification of bauxite.

Figure 1. Production and classification of bauxite



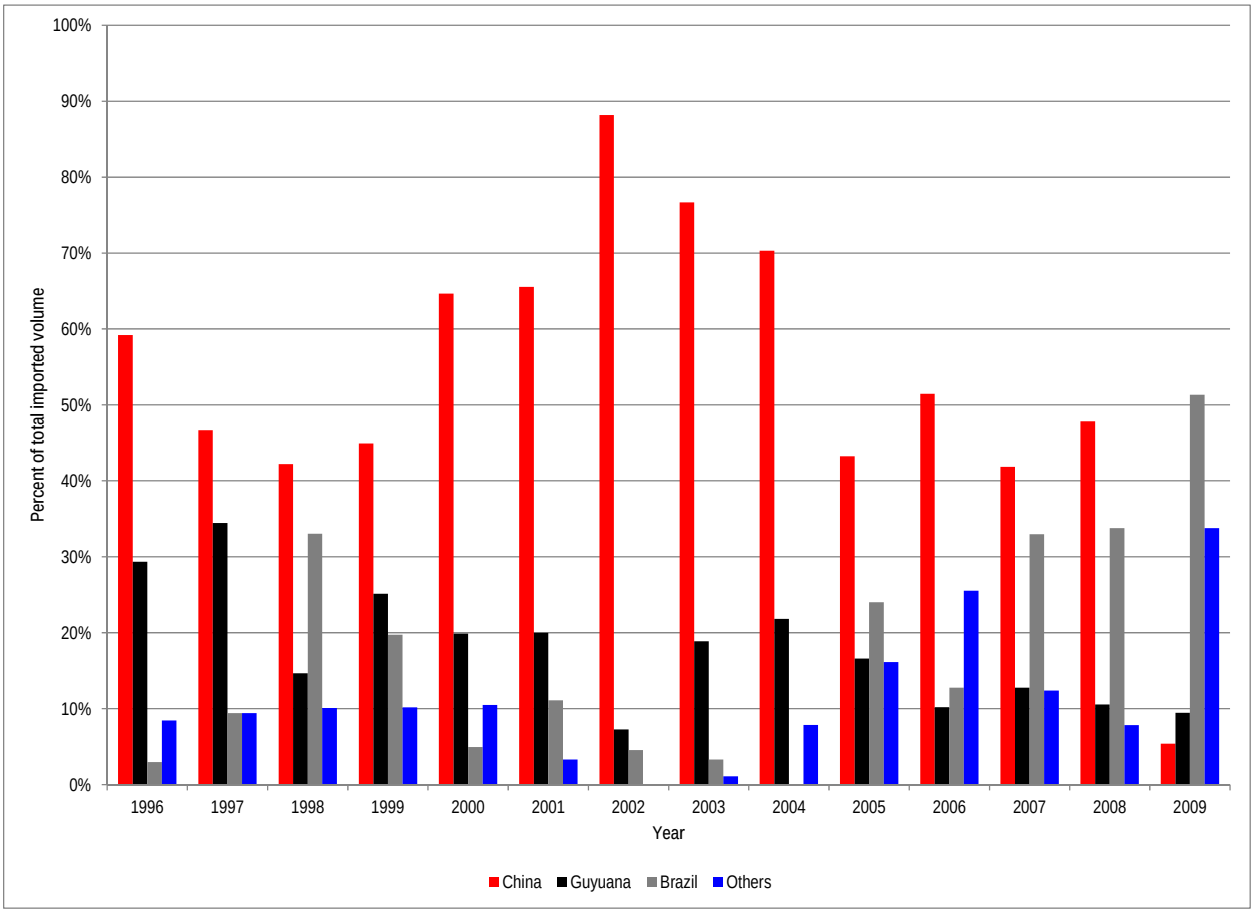
Source: Roskill Information Services Ltd., The Economics of Bauxite and Alumina, Sixth Edition, 2005, p. 13 and Kogel et al, Industrial Minerals & Rocks: Commodities, Markets, and Uses, 7th Edition, p. 228.

[25] Roskill Information Services Ltd., p. 12. Note, however, that some deposits allow for mining of both non-metallurgical and metallurgical grade bauxite. Kogel et al., pp. 227, 237, and 239.
[26] Roskill Information Services Ltd., p. 208 and Kogel et al., p. 240.
[27] Roskill Information Services Ltd., pp. 2 and 12.
[28] Roskill Information Services Ltd., p. 12 and Kogel et al., pp. 237-238.
[29] Roskill Information Services Ltd., p. 355.

D. China is the main source of U.S. refractory grade bauxite

16. Virtually all bauxite consumed in the U.S. market is imported.[30] From 2002 to 2008, China was the predominant source of bauxite for the U.S. with its imports representing 42 to 88 percent of all imported refractory grade bauxite.[31] Figure 2 shows imports of refractory grade bauxite from China, as well as other countries, expressed as a percent of total volume of U.S. imports before and during the class period.

Figure 2. U.S. imports of refractory grade bauxite



Source: U.S. Geological Survey, Minerals Yearbook, Bauxite and Alumina, 1997-2010.

17. Shanxi and Guizhou provinces are the two main sources of Chinese refractory grade bauxite bound for export with other provinces supplying the domestic market. Shanxi, whose

[30] As of 2003, at least one domestic source of bauxite existed; Kogel et al., pp. 231, 240, and 244 and Roskill Information Services Ltd., p. 5.
[31] U.S. Geological Survey, Minerals Yearbook, Bauxite and Alumina, 2003-2009.

ore is of higher purity, represents 60 to 70 percent of exports, while Guizhou, characterized by denser bauxite, accounts for the remaining 30 to 40 percent.

III. Estimation of Damages Suffered by Class Members

18. In this matter, the injury to class members arises because they purchased Chinese refractory grade bauxite at prices higher than they would have paid but for the defendants' alleged misconduct. I have been retained by counsel for the plaintiff in this matter to determine whether there was class-wide injury and to quantify damages owed to class members as a result of that injury. As part of this assignment, I quantify the extent by which prices for Chinese refractory grade bauxite were higher than those that would have prevailed but for the alleged misconduct.

A. Methodology overview

19. The calculation of damages arising from a conspiracy to fix price usually involves two steps. In the first step, one develops a model of the price paid for the product involved in order to determine the extent to which price was higher as a result of the alleged misconduct. The difference between the actual, conspiratorial price and the price that would have prevailed but for the alleged misconduct is sometimes referred to as the "overcharge," and it may be expressed as a percentage or as an amount per unit of the good sold. In the second step of the damages analysis, the overcharge is applied to the dollar value of sales that occurred in the marketplace in order to calculate the aggregate damages suffered by class members.

20. To calculate the overcharge in this matter, I use a method known as a benchmark, but I extend the benchmark analysis to account for other factors which may have affected pricing by using a technique called multiple regression analysis. In a benchmark analysis, the overcharge is calculated by comparing the price that arose as a result of the alleged conspiracy with the price for that product in some market in which there was non-conspiratorial pricing. One possible method is to compare prices for the good in the same market at different points in time, e.g. during the conspiracy period and during some non-conspiratorial period. Such method is referred to as a "before-during-after" analysis; two variants of this analysis are the "before-during" and the "during-after" comparison.

21. In this matter, the conspiracy is alleged to continue until 2009 and defendants have not provided any sales data after March 2009, so there is no period after the conspiracy on which to base an overcharge measure.[32] However, since Chinese refractory grade bauxite was sold to the U.S. for many years before the conspiracy began, there is a "before" period which is free from conspiratorial pricing. Therefore, I use the "before-during" benchmark to measure the effect of the alleged conspiracy on refractory grade bauxite prices. In this case I use the period from March 2002 through December 2002 as the "before" period and the period from January 2003 through March 2009 as the "during" period.[33]

22. The benchmark methodology is an accepted method for calculating damages in the field of antitrust economics.[34] It has been widely used for many years in calculating damages that arise from collusive pricing of the sort alleged here.[35]

23. The two defendants in this matter, Bosai and CMP, have produced some invoices on their exporting sales of refractory grade bauxite into the U.S. However, the defendants may not have provided the complete set of such invoices. For example, defendant Bosai has not produced any invoices for August 2004 through January 2006, January 2007 through May 2007, and November 2007 through May 2008; defendant CMP has not produced any invoices prior to March 2003. In addition, it is my understanding that the co-conspirators have not produced any data in this matter to date. Therefore, I reserve the right to revise my damages analysis when more information becomes available to me.

24. In measuring the overcharge in a matter that involves a price-fixing conspiracy such as this one, the analysis should control for other relevant factors so that the measured overcharge includes only the effect of the conspiracy on prices. If all the other factors that affect refractory grade bauxite prices are the same during the before period (on average) as during the period of the alleged conspiracy, then it would be possible to simply compare the difference in prices in

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[32] CMP provided only one transaction in 2009 (see CMP_000082). Bosai did not provide any transaction in 2009. Laura Liang, deputy manager of bauxite exporting department of Bosai, testified that Bosai's bauxite exporting department ceased to exist after 2009 (see Deposition of Laura Liang, April 18, 2014, p. 14).
[33] Defendant Bosai provided sales data starting from March 23, 2002. See 5_BOS_000242.
[34] Daniel Rubinfeld, "Reference Guide on Multiple Regression," *Reference Manual on Scientific Evidence*, Federal Judicial Center 2000, Second Edition (hereafter "Rubinfeld"), pp. 181-185.
[35] See, for example Robert B. Bergstrom, "The Role of the Expert in Proving and Disproving Damages in Antitrust Claims," *Antitrust Bulletin* (1967), pp. 677-706.

the two periods. However, such a direct comparison is usually not appropriate in measuring damages. The need to consider the effect of other factors on price arises because even when suppliers collude to set price, prices may still be affected by other factors.

25. Prices for refractory grade bauxite depend on many factors, in the presence of the alleged price-fixing conspiracy as well as in the non-conspiratorial period. As I discuss below, factors which affect demand for refractory grade bauxite, as well as factors that affect its production costs or supply, are likely to influence price. If any of these market factors also vary between the class period and the before period, then movements in these other factors should be taken into account when determining the overcharge.

26. In order to control for changes in other factors which affect refractory grade bauxite prices in my comparison of the "before" period and the "during" period, I have employed a statistical technique known as multiple regression analysis. Multiple regression analysis considers the relationship between a single variable whose behavior we wish to explain (usually called the dependent variable) and a set of other variables that are important in explaining the behavior of the dependent variable (often called explanatory variables or "regressors"). In this analysis, I have developed a multiple regression model in which the price of Chinese refractory grade bauxite is the dependent variable; my model explains the behavior of refractory grade bauxite prices using information on market factors as well as a conspiracy indicator variable to measure the effect of the alleged conspiracy on prices. Multiple regression is an appropriate technique in this context because it controls for the impact of each explanatory variable upon the dependent variable, therefore allowing me to quantify the difference between prices during the alleged conspiracy and the benchmark period, i.e., the overcharge.

B. Model of Chinese refractory grade bauxite prices

27. To select the appropriate set of explanatory variables that determine fluctuations in market prices of Chinese refractory grade bauxite, I have considered supply and demand factors that are likely to drive the market prices as well as defendant heterogeneity. I have also included an indicator variable to capture and isolate the effect of the alleged conspiracy to raise prices above their competitive levels.

i. The dependent variable is the price paid by direct purchasers of refractory grade bauxite

28. One input in the development of a multiple regression model is data on the variable to be explained. In this case, it is the prices paid by direct purchasers of refractory grade bauxite products for delivery or use in the U.S. from the defendants or their co-conspirators. Since none of the co-conspirators have produced their sales and price data of refractory grade bauxite to date, I have relied upon the invoice data produced by the two defendants, Bosai and CMP.[36]

ii. Demand factors

29. Even in the presence of anticompetitive behavior, the price of refractory grade bauxite is affected by demand factors. Typically, demand for a product used as a production input, such as refractory grade bauxite, is affected by demand for any of the goods that it is used to produce. Refractory grade bauxite is predominantly consumed in the manufacture of steel. Therefore, one factor which may influence demand and thus market prices for refractory grade bauxite is the level of steel production.

30. During the period considered here (2002-2009), world steel production and Chinese steel production increased every year until the end of 2007 and then declined sharply in 2008. However, Chinese steel production experienced particularly rapid growth and accounted for more than 40 percent of world steel production by the end of the class period. From 2002 to 2009, the compound annual growth for world steel production was 5.7 percent; for Chinese steel production, 17.2 percent. Increases in steel production are likely followed by increased demand for refractory grade bauxite as new mills are constructed and existing ones repaired.

31. Given that the use of refractory grade bauxite in Chinese refractories (which depends in turn on the level of steel production) is an important source of demand for Chinese refractory grade bauxite, I have included Chinese steel production reported by the International Iron and Steel Institute as an explanatory demand variable in my regression analysis. In addition, increases in steel production are likely to be more useful in explaining demand because they represent the need for additional capacity; therefore I use lagged values of the percent change in Chinese steel production over the past twelve months as explanatory variables. This also

[36] I reserve the right to revise my damages analysis when more data and information become available to me.

accounts for the fact that steel production affects demand for refractory grade bauxite with a significant lag.

32. U.S. refractories also demand Chinese refractory grade bauxite for the production of steel domestically. The U.S. consumes roughly half of the western world's total refractory grade bauxite, predominantly in the production of iron and steel.[37] I have included U.S. steel production reported by the International Iron and Steel Institute as an explanatory variable in my regression analysis, modified to reflect the percent change in production over the past twelve months.

33. Fluctuations of world foreign exchange rates relative to the Chinese yuan can affect the competitiveness of Chinese refractory grade bauxite sold on the export market. For instance, if the Chinese yuan depreciates in value relative to other currencies, then the same yuan-denominated price for refractory grade bauxite translates into a lower price in terms of the buyer's domestic currency. Conversely, if the Chinese yuan appreciates in value, the same yuan-denominated price for refractory grade bauxite translates into a higher price in terms of the buyer's domestic currency. Therefore, changes in foreign currency markets may affect the price of Chinese refractory grade bauxite in the export market. In particular, changes in the value of the yuan relative to the U.S. dollar, although limited during the time period I consider here, would affect prices paid by U.S. consumers directly.

34. To account for movements in the value of the Chinese currency on prices for Chinese refractory grade bauxite, I used two exchange rate variables. The first variable measures the value of the Chinese yuan vis-a-vis the U.S. dollar and is available from the Board of Governors of the Federal Reserve System.[38] For much of the estimation period prior to July 2005, the yuan's value was pegged to the U.S. dollar. However, in July 2005 the yuan was allowed to appreciate versus the U.S. dollar for the first time in many years.[39] In addition to the yuan to dollar exchange rate, I also use an exchange rate that measures the value of the yuan vis-a-vis a broad basket of world currencies. This exchange rate series, which is compiled by the

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[37] Kogel et al., p. 244; Roskill Information Services Ltd., p. 226; and U.S. Environmental Protection Agency, p. 2-29.
[38] http://www.imf.org/external/np/fin/ert/GUI/Pages/CountryDataBase.aspx.
[39] "Yuan high marks float anniversary," *BBC News*, http://news.bbc.co.uk/2/hi/business/5202462.stm.

International Monetary Fund, represents the value of the yuan generally in international markets.[40] The yuan appreciated during the mid to late 1990s, began to depreciate in 2002, and then began to appreciate again from 2005 to the end of the class period. I considered the percent change in the value of the yuan over the last twelve months as explanatory variables. Because it often took up to three months to ship bauxite from China to the U.S., prices are quoted a few months earlier in U.S. dollars, I used the lagged exchange variables in my model.

iii. Supply factors

35. I also considered supply factors that may influence the market price of refractory grade bauxite. Since nearly 13,000,000 British thermal units (BTUs) are required during the calcination phase per ton of product produced in order to reach temperatures of 1,700 to 1,800˚C, the cost of energy is potentially an important determinant of refractory grade bauxite prices.[41] In addition, I took into account the increasing cost of raw materials in China. To account for changes in the cost of raw materials and energy, I included in my regression model the purchasing price index for raw materials, fuel and power as one explanatory variable and modified it to reflect the percent change in the index over the past twelve months. I used the purchasing price index obtained from the National Bureau of Statistics of China.[42] Jianhong (John) Liu, vice president of Bosai, testified that labor cost is a pricing factor.[43] I obtained the average wage of manufacturing staff from the National Bureau of Statistics of China and included the percent change in the wage over the past twelve months in the regression model. [44] Because it may take time for changes in production costs to be reflected in bauxite prices, I used the lagged values of the Chinese purchasing price index and average wage of manufacturing staff in the model.

36. In addition, I considered the total factor productivity (TFP) in China.[45] Even though the cost of raw materials, energy, and labor increased during the period considered here, development economics literature suggests that the increasing total factor productivity allowed

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[40] http://www.imf.org/external/np/fin/ert/GUI/Pages/CountryDataBase.aspx.
[41] Kogel et al., p. 242.
[42] http://www.stats.gov.cn/tjsj/ndsj/2010/indexeh.htm.
[43] See Deposition of Jianhong Liu, April 22, 2014, p. 39.
[44] http://www.stats.gov.cn/english/Statisticaldata/AnnualData/.
[45] http://www.ey.com/Publication/vwLUAssets/China_productivity_imperative_en/$FILE/China-Productivity-Imperative_en.pdf, see Figure 3.

developing countries, such as China, to enhance production efficiency in order to maintain competitiveness in the global market.[46]

37. Another factor which can affect the supply of refractory grade bauxite products from China is a change in the general price level, or inflation, in China. The faster other prices increase, the more prices for refractory grade bauxite are likely to increase as well. I control for these effects by including annual consumer price inflation in China, which was obtained from the International Monetary Fund.[47] I used the lagged value of the consumer price index since price changes may not immediately be passed through to prices for Chinese goods.

iv. A defendant indicator variable controls for the price differential between the two defendants

38. The transaction and invoice data provided by the two defendants indicate that CMP often charged higher prices than Bosai did. To account for the price differential between the two defendants, I included an indicator variable for one defendant (CMP) that takes value one if a transaction belongs to CMP and zero if it belongs to Bosai.

v. An indicator variable controls for the operation of the conspiracy

39. In this matter the plaintiff alleged that the operation of the conspiracy resulted in higher prices for refractory grade bauxite products in the U.S. To determine the extent, if any, by which prices for refractory grade bauxite products are higher because of the operation of the alleged conspiracy, I included a conspiracy indicator variable that takes the value one from January 2003 to March 2009 and zero elsewhere. The coefficient on this variable can be used to calculate the

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[46] "The higher total factor productivity (TFP) growth projection in the China country report indicates that reliance on energy imports can be reduced by as much as 60 percent and minerals by 50 percent. Aided by FDI and information technologies, China and India along with other developing countries are finding it increasingly easier to transfer technology from developed countries to exercise their comparative advantage in manufacturing." See "Rapid Growth of Selected Asian Economies: Lessons and Implications for Agriculture and Food Security." *FAO Regional Office for Asia and the Pacific*. RAP Publication 2006/04. pp. 9. "Additionally, a greater share of the economy (mainly the export sector) was exposed to competitive forces. Local and Provincial governments were allowed to establish and operate various enterprises without interference from the government. In addition, FDI in China brought with it new technology and processes that boosted efficiency." See Wayne M. Morrison. "China's Economic Rise: History, Trends, Challenges, and Implications for the United States." *Congressional Research Service*. August 21, 2014. pp. 5.

[47] http://stats.oecd.org/Index.aspx?DataSetCode=G20_PRICES#.

percentage by which prices for refractory grade bauxite are higher as a result of the alleged conspiracy during the class period.

C. Regression estimates of the overcharge

40. The results of the multiple regression model of refractory grade bauxite prices are presented in Table 2. The model is estimated with variables converted to their natural logarithms. A "log-log" specification such as this is often used in econometric analysis because it allows one to interpret coefficients on the explanatory variables as the percent change in the price arising from a one percent increase in the explanatory variable. The coefficient estimates represent the average impact that each explanatory variable has on price, controlling for other factors in the model.

41. One statistic which is often used to evaluate performance of an econometric model is the *R*-squared statistic. The *R*-squared statistic measures the share of total variation in the dependent variable which is explained by the model.[48] The model of refractory grade bauxite prices developed here explains 75.7 percent of the variation in the dependent variable. Another summary statistic which is used for model evaluation is the *F* statistic. The *F* statistic allows one to test whether or all explanatory variables taken as a group are related to the dependent variable. For this model, the *F*-statistic is highly statistically significant, meaning the regressors are collectively useful in explaining the dependent variable.

42. Another way to examine the explanatory power of variables included in the model is to examine *t*-statistics.[49] Associated with each explanatory variable included in the multiple regression analysis is a coefficient which is estimated in the statistical procedure. The coefficient shows the impact of the independent variable on the dependent variable. Each coefficient has a *t*-statistic associated with it. While the *t*-statistic will always have the same algebraic sign as the coefficient, the magnitude or absolute value of the *t*-statistic will vary depending on how strong the statistical relationship is. The higher is the *t*-statistic (in absolute value, ignoring its sign) the more confidence can be placed in the estimated coefficient. When the *t*-statistic exceeds a certain level, the variable is considered to be "statistically significant" at

[48] Peter Kennedy, *A Guide to Econometrics, Third Edition* (Cambridge, MA: The MIT Press), 1994, pp. 26-28.
[49] Kennedy, pp. 55-61.

that level. Many of the individual coefficients in the model are statistically significant individually, because their *t*-statistics exceed the critical value.

43. An additional way to determine whether the model performs as expected is to examine the behavior of all the lags of a variable or several related variables taken together to see if they behave as expected as a group. In examining steel production in China and U.S., purchasing price index of raw materials, fuel and power, manufacturing labor cost and total factor productivity in China, Chinese CPI, and exchange rates of RMB (yuan), I look at the sum of the coefficients on their lags, which is a common way to determine their joint effect on the dependent variable. The variables measuring steel production in China and U.S. are jointly statistically significant; the Chinese purchasing price index of raw materials, fuel and power together with Chinese manufacturing labor cost and total factor productivity are jointly statistically significant; the Chinese CPI variables are jointly statistically significant; the exchange rate variables are jointly statistically significant.

44. The conspiracy indicator variable included in the model measures the extent by which prices were higher as a result of the alleged conspiracy in this matter. This variable is positive and statistically significant at 5% level in the model. Because the multiple regression analysis is performed using the defendants' transaction and invoice data before and during the proposed class period, this result suggests that class members were all injured as a result of the alleged conspiracy, in that they paid a higher price for refractory grade bauxite products during the class period than they otherwise would have. This regression analysis is one piece of evidence that the proposed class members were injured as a whole.

45. The coefficient on the conspiracy indicator variable in Table 2 can be used to estimate the overcharge suffered by class members. Table 3 shows the estimated overcharge percentage from the regression model. The overcharge percentage indicates that the prices paid for refractory grade bauxite were 24.9% higher than the but-for prices as a result of the alleged conspiracy.[50]

[50] In order to obtain the percentage overcharge from the estimated coefficient it is necessary to make a technical adjustment. For a discussion of this issue see Robert Halvorsen and Raymond Palmquist, "The Interpretation of Dummy Variables in Semilogarithmic Equations," *American Economic Review*, June 1980 and Peter Kennedy, "Estimation with Correctly Interpreted Dummy Variables in Semilogarithmic Equations," *American Economic Review*, September 1981.

Table 2. Chinese refractory grade bauxite regression model results

Observations	155			F Statistic	85.50
Root MSE	0.3045			Prob > F	0.000
				R-squared	0.757

Explanatory variables	Coefficient estimate	Standard error	*t* - Statistic	*p* -value	Statistical significance [a]
(1) Annual growth in Chinese steel production					
1 month lag	1.637	0.742	2.210	0.029	**
2 month lag	-0.754	0.623	-1.210	0.228	
3 month lag	1.707	0.812	2.100	0.037	**
(2) Annual growth in US steel production					
1 month lag	-0.371	0.628	-0.590	0.555	
2 month lag	-1.562	1.080	-1.450	0.150	
3 month lag	1.738	0.976	1.780	0.077	*
(3) Annual growth in Chinese purchasing price index of raw materials, fuel and power					
1 month lag	2.332	3.632	0.640	0.522	
2 month lag	-2.260	2.857	-0.790	0.430	
3 month lag	0.259	1.776	0.150	0.884	
(4) Annual growth in Chinese manufacturing labor cost					
1 month lag	-11.968	7.215	-1.660	0.100	*
2 month lag	8.960	7.721	1.160	0.248	
3 month lag	4.575	6.040	0.760	0.450	
(5) Chinese total factor productivity	-0.384	0.257	-1.500	0.137	
(6) Annual growth in the Chinese Consumer Price Inflation					
1 month lag	6.263	8.165	0.770	0.444	
2 month lag	4.404	8.447	0.520	0.603	
3 month lag	-6.720	4.873	-1.380	0.170	
(7) Annual growth in the Yuan / USD foreign exchange rate					
1 month lag	9.615	15.410	0.620	0.534	
2 month lag	-13.742	21.667	-0.630	0.527	
3 month lag	-6.273	15.191	-0.410	0.680	
(8) Annual growth in the Yuan / World foreign exchange rate					
1 month lag	-0.904	1.974	-0.460	0.648	
2 month lag	-2.151	2.870	-0.750	0.455	
3 month lag	-0.198	1.632	-0.120	0.904	
(9) Defendant indicator	0.204	0.054	3.760	0.000	***
(10) Constant	4.416	0.615	7.180	0.000	***
(10) Conspiracy indicator [b]	0.228	0.114	2.010	0.047	**

[a] Statistical significance levels: *** < 1% significance level, ** < 5% significance level, and * < 10% significance level.

[b] Conspiracy period is from January 2003 to March 2009.

Table 3. Estimated overcharge percentage

Collusion Period	Estimated overcharge percentage
January 2003 to March 2009	24.9%

D. Damages

46. To estimate damages, the overcharge percentage in Table 3 is applied to bauxite sales using the following formula.[51]

$$\frac{Overcharge\%}{1 + Overcharge\%} \times Sales$$

47. Table 4 presents the total damages suffered by class members on their purchases of Chinese refractory grade bauxite imported to the U.S. based on my analysis. Class-wide damages are $27.47 million before trebling.

Table 4. Estimated overcharge on Chinese refractory grade bauxite imported into the U.S.

	2003	2004	2005	2006	2007	2008	2009	Total
US import value	$ 5,730,000	$ 15,300,000	$ 14,100,000	$ 15,900,000	$ 17,600,000	$ 63,100,000	$ 6,190,000	$ 137,920,000
Overcharges	$ 1,141,415	$ 3,047,758	$ 2,808,718	$ 3,167,278	$ 3,505,917	$ 12,569,510	$ 1,233,047	$ 27,473,643

Source (US import value): U.S. Geological Survey, Minerals Yearbook, Bauxite and Alumina, 2004-2010.

48. Table 5 presents the damages suffered by class members on their purchases of Chinese refractory grade bauxite from the two defendants. The damages due to Bosai and CMP's collusive behavior are $2.46 million and $2.19 million respectively before trebling.

Table 5. Estimated overcharges on Chinese refractory grade bauxite purchased from the defendants

	2003	2004	2005	2006	2007	2008	2009	Total
Bosai sales	$4,269,135	$2,399,987		$572,914	$946,746	$4,140,211		$12,328,992
Bosai overcharges	$850,411	$478,077		$114,124	$188,592	$824,729		$2,455,933
CMP sales	$1,110,968	$1,956,490	$1,108,844	$1,298,338	$2,053,861	$3,338,917	$133,665	$11,001,083
CMP overcharges	$221,305	$389,732	$220,882	$258,629	$409,129	$665,112	$26,626	$2,191,414

Source: Defendants' sales analysis.

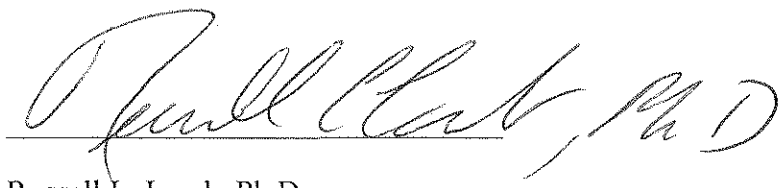
[51] The 24.9% reported in Table 3 is the percent of overcharge with respect to the but-for prices; $\frac{Overcharge\%}{1+Overcharge\%}$ represents the overcharge with respect to the actual prices.

VI. Conclusions

49. I have demonstrated that it is possible to measure the overcharge to the class as a whole using a formulaic method, class-wide evidence, and without individual inquiry. I can do this by comparing the actual prices from within the conspiracy period with the prices but for the conspiracy using multiple regression analysis, and then multiplying the total volume of sales by the overcharge with respect to the actual prices to arrive at the total overcharges incurred by the class during the class period.

50. Based on my analysis of the market for Chinese refractory grade bauxite, I have determined that all class members were injured as a result of the alleged conspiracy, in that they paid higher prices than they would have paid but for the alleged conspiracy. I have calculated class-wide damages suffered by class members using a multiple regression analysis. The class-wide damages arising from the collusive behavior are $27.47 million. The damages suffered by class members for the refractory grade bauxite products purchased from Bosai and CMP are $2.46 million and $2.19 million respectively.

I swear under penalty of perjury under the laws of the State of Pennsylvania and the U.S. that the foregoing is true and correct to the best of my knowledge, information, and belief.



Russell L. Lamb, Ph.D.

September 29, 2014

Exhibit B

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF PENNSYLVANIA

RESCO PRODUCTS, INC., Plaintiff, v. BOSAI MINERALS GROUP CO., LTD, CMP TIANJIN CO., LTD Defendants.	Civil Action No.: 2:06-cv-325-JFC

SUPPLEMENTAL EXPERT REPORT CONCERNING DAMAGES

Dr. Russell L. Lamb
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December 15, 2014

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I. Introduction and Summary of Conclusions

A. Expert qualifications

1. I listed my background and qualifications in my Expert Report Concerning Damages ("Lamb Damages Report"), filed on September 29, 2014. A copy of my C.V., including a list of the matters in which I have submitted expert testimony in the past four years, is attached to this report as Appendix A.

B. Assignment

2. As described in the Lamb Damages Report, I have been retained by Counsel for Plaintiffs in this matter to determine class-wide damages.[1] In the Lamb Damages Report (as well as this Supplemental Damages Report), I assume that the Defendants conspired to "[fix] prices and [control] the supply of refractory grade bauxite" from as early as January 1, 2003 until sometime in 2009 ("Damages Class Period").[2] I also assume that the trier of fact will determine whether the alleged misconduct represents a violation of the antitrust laws. I do not, however, assume all proposed class members were injured and suffered damages as a result of the Defendants' alleged anticompetitive conduct. Rather, the analysis of those issues is the focus of the Lamb Damages Report, as well as this Supplemental Damages Report.

3. Based on my analysis of the market for refractory grade bauxite in the United States and my training and experience as an economist, I reach the following conclusions in the Lamb Damages Report:

a. All proposed class members were injured as a result of the Defendants' alleged misconduct, in that they paid more for refractory grade bauxite products than they would have paid but for the Defendants' alleged misconduct;

b. Estimated damages owed to proposed class members for their total imports are $27.47 million before trebling; and

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[1] Dr. Russell L. Lamb, "Expert Report Concerning Damages," September 29, 2014 (hereafter "Lamb Damages Report") at ¶4.

[2] In the United States District Court for the Western District of Pennsylvania, Resco Products, Inc. v. Bosai Minerals Group Co. Ltd., et al, "First Amended Class Action Complaint," July 17, 2009 (hereafter "Complaint") at ¶¶1, 2. Laura Liang, deputy manager of bauxite exporting department of Bosai, testified that Bosai's bauxite exporting department ceased to exist after 2009. Deposition of Laura Liang, April 18, 2014, p.14.

c. Estimated damages that are attributable to the two Defendants, Bosai and CMP, are $2.46 million and $2.19 million, respectively, before trebling.[3]

4. On November 13, 2014, a liability report was filed by Dr. Frederick Warren-Boulton ("Warren-Boulton Liability Report") on behalf of the Defendants.[4] After the submission of the Warren-Boulton Liability Report, I was asked by Counsel for Plaintiff to:

a. Evaluate the Warren-Boulton Liability Report; and
b. Evaluate the opinions and conclusions reached in the Lamb Damages Report in light of the opinions offered by Dr. Warren-Boulton.

A complete list of the materials I have relied upon in forming my opinions is contained in Appendix B.

C. Conclusions

5. Based upon my review of the Warren-Boulton Liability Report, I find that his conclusions fall into one of two categories.

a. Many of Dr. Warren-Boulton's analyses and conclusions are flawed and unreliable, based upon unreliable data, incorrect industry facts and economic evidence, and flawed applications of statistics and regression analyses; and
b. In some cases, Dr. Warren-Boulton fails to demonstrate his criticisms are material to my conclusions, and in fact, he does not incorporate his own criticisms in his econometric models.

6. I have reviewed the analyses and conclusions contained in the Lamb Damages Report in light of Dr. Warren-Boulton's criticisms. Nothing in the Warren-Boulton Liability Report, or cited materials contained therein, causes me to change the conclusions summarized in paragraphs 3.a through 3.c above. I have incorporated Dr. Warren-Boulton's criticisms into my multiple regression analyses of the proposed class member overcharge where appropriate (which I discuss in more detail below). However, these modifications result in higher damages and reaffirm that my damages estimate is conservative.

[3] Lamb Damages Report at ¶7.
[4] Dr. Frederick R. Warren-Boulton, "Expert Report Concerning Liability," November 13, 2014 (hereafter "Warren-Boulton Liability Report").

II. Dr. Warren-Boulton's Key Claims are based on Flawed Data and Analyses and are Therefore Unreliable

7. I have reviewed the Warren-Boulton Liability Report. Many of Dr. Warren-Boulton's analyses and conclusions are flawed and unreliable, based upon unreliable data, incorrect industry facts and economic evidence, and flawed applications of statistics and regression analyses. I discuss many of the flaws in the Warren-Boulton Liability Report below. The flaws I identify below undermine Dr. Warren-Boulton's opinions and render them unreliable. In fact, when interpreted properly, the Warren-Boulton Liability Report further bolsters my own conclusions and analyses.

A. Contrary to Dr. Warren-Boulton's claim, Chinese domestic price is an invalid benchmark for comparing its export price to the U.S. market

8. Dr. Warren-Boulton claims that the domestic price of refractory grade bauxite in China should be used as a "control" because all demand and supply "factors can be expected to have affected equally domestic and export prices."[5] The fundamental methodological error in his claim is he fails to recognize that the alleged misconduct (i.e., restricting the supply of refractory grade bauxite) could potentially have impacted both export and domestic prices. As a matter of fact, China's Anti-Monopoly Law ("AML") only became effective in August 2008.[6] During the majority of the Damages Class Period, China did not have a law in place preventing domestic price-fixing. Dr. Warren-Boulton makes no effort to determine if the Chinese domestic market was comparable to the U.S. market, unaffected by the alleged misconduct. Instead, he presumes that the Chinese domestic price is a valid benchmark for comparing its export price to the U.S. market price. Given that the domestic price of refractory grade bauxite could potentially have been tainted by the alleged misconduct, this renders the domestic price variable to be endogenous.[7] Therefore, it is invalid to include the domestic price as a control in regression analyses.

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[5] Warren-Boulton Liability Report, p. 15.

[6] Jones Day Publication, *New Chinese Anti-Monopoly Law*, October 2007, available at http://www.jonesday.com/new_chinese_anti-monopoly_law/.

[7] "When there is correlation between a regressor and the error term, that regressor is said to be endogenous; when no such correlation exists the regressor is said to be exogenous. Endogeneity gives rise to estimates biased even asymptotically, making economists very unhappy." Peter Kennedy, "A Guide to Econometrics," Sixth Edition, 2008, p.139.

9. In addition, even though Dr. Warren-Boulton claims that the Chinese domestic price of refractory grade bauxite should be used, he has no appropriate variable to represent the domestic price in two of his three preferred regression models (Exhibit 5 and Exhibit 6 in the Warren-Boulton Liability Report). In fact, Dr. Warren-Boulton only uses Defendant Bosai's domestic price and assumes that Defendant CMP's domestic price is the same as Bosai's in his first preferred model (Exhibit 5 in the Warren-Boulton Liability Report).[8] In the absence of collusion in the domestic market, it is unlikely that Bosai and CMP would have had identical domestic prices every year from 2003 to 2008. Assigning identical domestic prices to both Defendants results in Dr. Warren-Boulton's domestic price variable to be measured with error. It is well-established in econometrics literature that as the result of such measurement error, the estimates in this model have attenuation bias, which means they are numerically smaller than the true effects that economists intend to quantify. Standard econometrics textbooks conclude that such estimates are flawed and unreliable.[9]

10. In his second preferred model (Exhibit 6 in the Warren-Boulton Liability Report), however, Dr. Warren-Boulton takes a different approach. He estimates the regression using only Defendant Bosai's data and completely discards Defendant CMP's data (which accounts for approximately two thirds of the regression data). It is commonly accepted in statistics and econometrics literature that neglecting a large portion of data results in significant information loss, yielding misleading estimates.[10] Using all available and reliable data is preferred.

B. Contrary to Dr. Warren-Boulton's claim, Bosai's raw material cost is an invalid and inferior measure of cost compared to the cost variables used in my regression model

11. Dr. Warren-Boulton claims that the purchasing price index for raw materials, fuel and power[11] that I use in my regression analyses is "broad" and not "specific to the raw materials used in the production of RGB."[12] Instead, he uses Bosai's cost of refractory grade bauxite in one of his preferred regression models (Exhibit 7 in the Warren-Boulton Liability Report). His raw material cost variable for Bosai is, however, constructed in a peculiar way. Bosai only produced

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[8] See Warren-Boulton backup material regdata.sas7bdat. To the best of my knowledge, Defendant CMP only produced its transaction data on export prices but did not produce its domestic price data.
[9] Jack Johnston and John DiNardo, *Econometric Methods*, Fourth Edition (The McGraw-Hill Companies), 1996, pp. 153-154. Russell Davidson and James MacKinnon, *Econometric Theory and Methods* (Oxford University Press), 2004, pp. 312-313.
[10] See Section II.H for detailed discussion.
[11] http://www.stats.gov.cn/tjsj/ndsj/2010/indexeh.htm
[12] Warren-Boulton Liability Report, p. 18.

its domestic cost data from 2003 through 2008 and not for 2002. Ignoring the 2008 cost data, Dr. Warren-Boulton uses Bosai's raw bauxite annual cost data from 2003 through 2007 to backcast Bosai's 2002 cost.[13]

12. The fundamental error in Dr. Warren-Boulton's backcasting procedure is that he uses the cost data during the conspiracy period (2003-2007) to estimate the cost for the non-conspiracy period (2002). Because the backcasted 2002 cost is computed as a function of the costs during the conspiracy period, it is potentially tainted by the alleged misconduct, and therefore should not be included in regression analyses for the purpose of calculating damages. As a matter of economics, Defendants' conspiratorial behavior (supply restriction) can impact their internal accounting costs and yield misleading overcharge estimates in regression analyses. My use of publicly available data such as the purchasing price index for raw materials, fuel and power in measuring cost for purposes of conducting regression analyses has been a common practice throughout my over 20 years of experience in economics and econometrics.

13. Furthermore, not much is known about the statistical properties of estimates from regressions using variables whose missing values are predicted or backcasted. In general, filling in missing values may lead to bias in the estimates which is difficult to quantify.[14]

14. In addition, Defendant CMP did not produce sufficient cost data during the Damages Class Period. In his third preferred model (Exhibit 7 in the Warren-Boulton Liability Report), Dr. Warren-Boulton again uses only Defendant Bosai's data and discards all of CMP's price data, which account for about two-thirds of the regression data. As discussed above in Section II.A, a significant amount of information is lost when the CMP data is neglected entirely, and the resulting regression analyses are flawed and unreliable, contrary to Dr. Warren-Boulton's claims.

C. *Dr. Warren-Boulton wrongly claims that mining labor cost instead of manufacturing labor cost should be considered*

15. Dr. Warren-Boulton claims that the manufacturing labor cost index that I use in my regression analyses "underestimates a significant contributor to rising labor costs overall for RGB" because a "substantial share of the relevant labor cost is associated with mining non-metallurgical bauxite."[15] In the industry background section of the Warren-Boulton Liability Report, however, Dr. Warren-Boulton acknowledges the fact that neither Defendant mined the

[13] See Warren-Boulton backup material Build Dataset 1.sas.
[14] William Greene, *Econometric Analysis*, Fifth Edition (Pearson Prentice Hall), 2003, pp. 59-60.
[15] Warren-Boulton Liability Report, p. 18 (emphasis in original).

bauxite ore which served as the raw material for the refractory grade bauxite it exported.[16] In fact, mining labor cost is part of Defendants' raw material cost, which I have taken into account in my regression analyses by using the purchasing price index for raw materials, fuel and power. I use the manufacturing labor cost index to account for Defendants' processing labor cost, as I understand that Defendants processed raw bauxite in their factories.[17] Dr. Warren-Boulton's criticism of my use of the manufacturing labor cost index is incorrect and based on his misunderstanding of the Defendants' role in the refractory grade bauxite supply chain.

D. Dr. Warren-Boulton wrongly claims that I include no independent variable that would reflect changes in transportation cost, apart from the Chinese consumer price index

16. Dr. Warren-Boulton claims that I include "no independent variable that would reflect changes in transportation cost," "apart from the Chinese consumer price index."[18] Contrary to Dr. Warren-Boulton's claims, I include in my regression analyses the purchasing price index for raw materials, fuel and power, in part because fuel is an important component of inland transportation cost. This index, criticized by Dr. Warren-Boulton for being "very broad" rather than "specific to the raw materials used in the production of RGB,"[19] is in fact a comprehensive index that measures the overall cost of raw materials, transportation, and energy in China.

E. Dr. Warren-Boulton offers no valid reason to drop the total factor productivity variable from my regression model

17. Dr. Warren-Boulton criticizes the results of my multiple regression model for being sensitive to the exclusion of "one statistically insignificant variable [total factor productivity]."[20] Consequently, he drops the total factor productivity ("TFP") variable, and claims that that this modification "reduces the estimated conspiracy effect by one third, and renders it statistically insignificant…"[21] I discuss below why Dr. Warren-Boulton's criticism is without merit.

18. Dr. Warren-Boulton provides no sound economic analysis or justification for why the TFP variable should be dropped from my multiple regression model. His sole reason for excluding this variable is that it is statistically insignificant in my model. In doing so, Dr. Warren-Boulton ignores the evidence that I provided in the Lamb Damages Report from development economics

[16] Warren-Boulton Liability Report, p. 8.
[17] Jian Hong (John) Liu Deposition at 38: 16-18. John Liu has been the vice president of Bosai since 2003-2004.
[18] Warren-Boulton Liability Report, p. 18.
[19] Warren-Boulton Liability Report, p. 18.
[20] Warren-Boulton Liability Report, p. 14.
[21] Warren-Boulton Liability Report, p. 14.

literature supporting the inclusion of this variable in my model.[22] Moreover, while the statistical significance of a regression coefficient is important in establishing that the estimated relationship between the dependent variable and relevant explanatory variable is not due to random chance, an over-reliance on statistical significance at the cost of economic significance can produce misleading conclusions. Studies contained in economics literature stress the importance of interpreting an empirical result in terms of both statistical and economic significance in order to draw proper inferences from a regression analysis.[23]

19. By excluding the TFP variable, which has an economically significant impact on the price of refractory grade bauxite, Dr. Warren-Boulton risks subjecting the measured overcharge to "omitted variable bias," which is commonly discussed in statistics and economics literature. Specifically, omitted variable bias arises when a relevant variable that is excluded from a regression model is correlated with other variables that are included in the model.[24] In technical terms, the exclusion of that variable leads to biased coefficient estimates for the variables included in the model. In fact, contrary to Dr. Warren-Boulton's claim, if the TFP variable were not important for explaining variation in refractory grade bauxite prices, the coefficients on the other variables would be robust with respect to the inclusion or exclusion of the TFP variable. However, this is not the case. For example, excluding the TFP variable results in an incorrect sign on the manufacturing labor cost variable. This sensitivity suggests that excluding this variable may result in omitted variable bias. Moreover, omitted variable bias may arise even if the excluded variable is not statistically significant. This suggests that the TFP variable should be included in the multiple regression model. Omission of the TFP variable therefore renders Dr. Warren-Boulton's model and estimates flawed and unreliable.

F. Dr. Warren-Boulton misinterprets the signs of estimated coefficients on lagged variables in my regression model

20. According to Dr. Warren-Boulton, a "sign of critical flaws in Dr. Lamb's analysis is the fact that the estimated effects of certain independent variables in Dr. Lamb's regression make no economic sense."[25] To support his claim, Dr. Warren-Boulton examines the signs of the coefficients on the *individual* lags of the manufacturing labor cost variable in my regression

[22] Lamb Damages Report at ¶36.
[23] Stephen Ziliak and Deirdre McCloskey, *The Cult of Statistical Significance: How the Standard Error Costs Us Jobs, Justice, and Lives (Economics, Cognition, and Society)* (University of Michigan Press), 2008.
[24] Robert Pindyck and Daniel Rubinfeld, *Econometric Models and Economic Forecasts*, Fourth Edition (Irwin/McGraw-Hill), 1998 (hereafter "Pindyck and Rubinfeld"), pp. 184-186.
[25] Warren-Boulton Liability Report, p. 22.

model and interprets based on the first lag of the cost variable that "a one percent increase in manufacturing labor costs over a one-year period produces an approximately 12 percent decline in the price of RGB one month after the year-over-year increase."[26]

21. Dr. Warren-Boulton incorrectly interprets the signs of the coefficients in my multiple regression model; his analysis is based on a flawed understanding of econometric analysis with lagged variables. As stated in the Lamb Damages Report, since it may take time for changes in production costs to be reflected in bauxite prices, I used lagged values of the Chinese purchasing price index and manufacturing labor cost in my model.[27] The correct way to interpret the impact of a variable that enters the model with lags is to look at the sum of the coefficients on the lags of that variable, and examine the *joint* effect of that variable on refractory grade bauxite price. The sum of the coefficients on the lags of the production cost variable captures its full impact on bauxite price.

22. When interpreted correctly, the estimated effect of manufacturing labor cost on refractory grade bauxite price is 1.567. Therefore, contrary to Dr. Warren-Boulton's criticism that the estimated effect of the manufacturing labor cost variable on bauxite price is negative and "[makes] no economic sense," the joint effect of manufacturing labor cost variable on bauxite price is positive and consistent with economic theory which predicts that increases in input costs lead to increases in price. Similarly, summing the coefficients on the lags of the Chinese CPI variable in my model results in a joint effect of Chinese CPI of 3.947. Again, the joint effect of Chinese CPI on bauxite price is positive, and consistent with economic theory.

G. Dr. Warren-Boulton's Chow Test is unreliable

23. Dr. Warren-Boulton criticizes my model on the grounds that I have "implicitly assumed that Bosai's prices and CMP's prices were affected to the same extent by changes in [the] independent variables and that the Bosai and CMP data could be 'pooled' (*i.e.*, used in the same regression)."[28] Dr. Warren-Boulton argues that data from Bosai and CMP "should not be pooled", and uses a Chow Test to support his argument.[29] As a matter of econometrics, Dr. Warren-Boulton's test is flawed and provides no reliable, scientific basis for criticizing my analysis.

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[26] Warren-Boulton Liability Report, p. 22 (emphases in original).
[27] Lamb Damages Report at ¶35.
[28] Warren-Boulton Liability Report, p. 20.
[29] Warren-Boulton Liability Report, p. 20.

24. To implement his Chow Test, Dr. Warren-Boulton adds interactions of all the explanatory variables with a Defendant dummy variable to my model and tests whether the coefficients on the interacted variables are *jointly* significant. Dr. Warren-Boulton has not provided valid economic reasoning for why *all* of the coefficients should be different across the Defendants. Moreover, to implement the Chow Test, Dr. Warren-Boulton estimates a regression with nearly 50 parameters and a sample of 155 observations. Such a sample size is insufficient to accurately estimate these many parameters in his regression. Therefore, his test based on his unreliable regression itself is unreliable.[30]

H. Dr. Warren-Boulton's regression models using only the Bosai data are unreliable as a matter of econometrics

25. Dr. Warren-Boulton estimates some of his regression models using only Bosai's data. Based on his regression in Exhibit 6, Dr. Warren-Boulton concludes that the "coefficient on the conspiracy indicator variable is 0.079 and is statistically insignificant."[31] Similarly, based on his regression in Exhibit 7, Dr. Warren-Boulton concludes that "'the conspiracy period' variable [is statistically] indistinguishable from zero…"[32] Both of these regressions estimated by Dr. Warren-Boulton are unreliable because he uses only a partial sample.

26. By ignoring all the data produced by CMP, each of Dr. Warren-Boulton's Bosai-only regressions in Exhibits 6 and 7 of the Warren-Boulton Liability Report makes use of 51 observations, which only accounts for about one-third of the Defendants' data. Using such a small sample, one cannot reliably and credibly estimate an overcharge and, therefore, Dr. Warren-Boulton has incorrectly concluded that the results are statistically insignificant.[33] Dr. Warren-Boulton's regression estimates are unreliable because it does not make use of all the data produced by Bosai and CMP.[34]

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[30] Douglas Bonett, "Sample Size Requirements for Testing and Estimating Coefficient Alpha," *Journal of Educational and Behavioral Statistics*, Winter 2002. p. 335.
[31] Warren-Boulton Liability Report, p. 28.
[32] Warren-Boulton Liability Report, p. 28.
[33] Douglas Bonett, "Sample Size Requirements for Testing and Estimating Coefficient Alpha," *Journal of Educational and Behavioral Statistics*, Winter 2002. p. 335.
[34] Dr. Warren-Boulton claims in footnote 46 of his report that, "Dr. Lamb presumably did not recognize that CMP produced contract data from 2002". I have reviewed CMP's data production and confirmed with Counsel for Plaintiffs that CMP did not produce contract data from 2002. If Dr. Warren-Boulton has received additional data from CMP, he should have used such data in his analyses rather than completely disregard all of the CMP data and estimate Bosai-only regressions.

27. Furthermore, Dr. Warren-Boulton attempts to "simplify" my model of bauxite prices, however, in the process of doing so, he develops models that fail to explain a large share of the variation in bauxite prices. The *R*-squared statistic is one measure of the "goodness-of-fit" of an econometric model which explains the percentage of variation in the dependent variable accounted for by the explanatory variables in the model. I discussed the use of *R*-squared in the Lamb Damages Report.[35] The higher the *R*-squared, the greater the percentage of the variation in the dependent variable explained by the model. The *R*-squared for Dr. Warren-Boulton's regression model in his Exhibit 6 is 0.215, indicating that only about 21 percent of the variation in his dependent variable is explained by his explanatory variables. By contrast, the *R*-squared of my multiple regression model is 0.757, indicating that the model explains 75.7 percent of the variation. The small sample size, together with the low *R*-squared of his model, suggests that Dr. Warren-Boulton's model is poorly specified and further undermines the reliability of his regression analyses.

I. Dr. Warren-Boulton's time varying overcharge estimates are flawed and nonsensical as a matter of econometrics

28. Dr. Warren-Boulton criticizes my multiple regression model for the "use of a single indicator variable to measure the effect of the alleged conspiracy."[36] Consequently, Dr. Warren-Boulton estimates a modified version of my model that allows the overcharge coefficient to be different for each year of the Damages Class Period. In order to implement this, he replaces the single conspiracy variable with separate indicator variables for each of the years from 2003 through 2009 in my regression model.[37] As shown in Exhibit 3 of the Warren-Boulton Liability Report, none of the conspiracy coefficients are statistically significant in any year, and the coefficients for 2003 and 2009 are negative.

29. Dr. Warren-Boulton's fatally flawed results arise because there is inadequate data with which to reliably estimate an annual overcharge. For example, Dr. Warren-Boulton himself notes that there is "only a single observation for 2009" with which I am "estimating the alleged effect of the conspiracy through 2009…." [38] A sound economic analysis should use all of the Defendants' data, including the one transaction in 2009, to estimate a single overcharge from 2003 through 2009, as I did.

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[35] Lamb Damages Report at ¶41.
[36] Warren-Boulton Liability Report, p. 21.
[37] Warren-Boulton Liability Report, p. 22.
[38] Warren-Boulton Liability Report, footnote 43.

J. Dr. Warren-Boulton's outlier identification procedure is flawed and one that he himself does not consistently rely upon

30. Dr. Warren-Boulton applies a "standard statistical procedure known as studentized residuals" to identify a "total of twelve outliers in the CMP data."[39] Dr. Warren-Boulton criticizes me for "[removing] from the data [only] one of [these] 12 outliers…."[40] For the reasons discussed below, Dr. Warren-Boulton's outlier identification methodology and criticism are flawed and without merit.

31. In the context of linear regression, an observation with a large studentized residual may be considered an outlier. In order to identify outliers on the basis of estimated residuals, one must specify an appropriate threshold for which observations outside of this threshold may be flagged as outliers. Dr. Warren-Boulton selects a threshold of 2.0. In other words, observations for which the value of the studentized residuals is greater than 2.0 or less than -2.0 are designated as outliers based on his threshold. His threshold, however, is not based on standard statistical procedures. Sound statistics practice requires using a Bonferroni-type approach to determine the appropriate threshold with which to detect outliers on the basis of studentized residuals.[41] Based on this approach, the threshold for an observation to be considered a *definite outlier* is 4.31, rather than Dr. Warren-Boulton's threshold of 2.0.[42] Based on the correct threshold, there is only one observation detected as a definite outlier, which is the outlier identified in the Lamb Damages Report.[43]

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[39] Warren-Boulton Liability Report, p. 21.
[40] Warren-Boulton Liability Report, footnote 50.
[41] Peter Bajorski, *Statistical Models, in Statistics for Imaging, Optics, and Photonics* (John Wiley & Sons, Inc.), 2011 (hereafter "Statistics for Imaging, Optics and Photonics") pp. 107-110.
[42] According to the Bonferroni-type approach, the studentized residual follows a Student-t distribution with (n-k-1) degrees of freedom, where n is the sample size and k denotes the number of predictors in the regression model. Then, a studentized residual that exceeds the threshold $t_{n-k-1}\,(\alpha/2n)$ is detected to be an outlier, where α is the level of significance. In the present context, the regression data that I have used has 156 observations. There are a total of 24 predictors in my multiple regression model. I have chosen α to be 0.01, as this is the recommended value for α when trying to detect observations to be *definite outliers* (See Statistics for Imaging, Optics and Photonics, pp.107-110). The threshold is 4.31 based on the critical value for the t distribution with 131 degrees of freedom, $\alpha = 0.01$, and n=156.
[43] This observation has a Contract No. "04-ZT500." I also implemented the Bonferroni-type approach to detect *likely outliers*, rather than definite outliers, in order to be less conservative in my outlier identification procedure. For the likely outlier threshold, it is recommended to use α equal to 0.05. Using the same values for n and k, the critical value for the t-statistic with 131 degrees of freedom and $\alpha = 0.05$ is 3.8874, which, when multiplied by $0.05/2n$, yields an outlier threshold value of 3.89. Even based on this alternative outlier threshold, the method detects only one observation to be a *likely outlier*, which is again the same observation that was considered to be an outlier in the Lamb Damages Report.

32. Furthermore, although Dr. Warren-Boulton opines that 12 outliers be dropped from the data based on his chosen threshold of 2.0, he does not consistently apply this rule in his own analyses. For example, in Dr. Warren-Boulton's model in which he drops the TFP variable, he estimates the new model on a sample that excludes just the one outlier identified in the Lamb Damages Report. He claims that "the estimated conspiracy effect [from this model] drops by one third and is no longer statistically significant."[44] However, if Dr. Warren-Boulton's model without the TFP variable is estimated on a sample that excludes the 12 outliers that he identified, the coefficient on the conspiracy indicator variable is 0.178 and statistically significant, and the estimated overcharge percentage indicates that the prices paid for refractory grade bauxite were 19 percent higher than the but-for prices as a result of the alleged conspiracy.[45] These results are shown in Figure 1 and Figure 2 below.

33. In conclusion, Dr. Warren-Boulton's outlier identification methodology is flawed, without merit, and not based on standard statistical practice. Moreover, he does not consistently apply his own preferred procedure. Finally, assuming Dr. Warren-Boulton's outlier identification procedure is correct, implementing his outlier removal on his own analyses demonstrates that proposed class members were overcharged on their purchases of refractory grade bauxite.

[44] Warren-Boulton Liability Report, p. 23.

[45] In order to obtain the percentage overcharge from the estimated coefficient it is necessary to make a technical adjustment. For a discussion of this issue see Robert Halvorsen and Raymond Palmquist, "The Interpretation of Dummy Variables in Semilogarithmic Equations," *American Economic Review*, June 1980 and Peter Kennedy, "Estimation with Correctly Interpreted Dummy Variables in Semilogarithmic Equations," *American Economic Review*, September 1981.

Figure 1. Regression without TFP and excluding 12 outliers

Observations	144	F Statistic	148.11
Root MSE	0.14146	Prob > F	0.000
		R-squared	0.934

Explanatory variables	Coefficient estimate	Standard error	*t*-Statistic	*p*-value	Statistical significance [a]
(1) Annual growth in Chinese steel production					
1 month lag	1.053	0.456	2.310	0.023	**
2 month lag	-0.623	0.337	-1.850	0.067	*
3 month lag	0.265	0.384	0.690	0.491	
(2) Annual growth in US steel production					
1 month lag	-0.082	0.330	-0.250	0.804	
2 month lag	-0.799	0.463	-1.730	0.087	*
3 month lag	0.864	0.362	2.390	0.018	**
(3) Annual growth in Chinese purchasing price index of raw materials, fuel and power					
1 month lag	2.507	1.976	1.270	0.207	
2 month lag	-2.727	1.872	-1.460	0.148	
3 month lag	1.334	0.994	1.340	0.182	
(4) Annual growth in Chinese manufacturing labor cost					
1 month lag	-11.287	3.372	-3.350	0.001	***
2 month lag	7.757	4.879	1.590	0.115	
3 month lag	-3.051	2.509	-1.220	0.226	
(6) Annual growth in the Chinese Consumer Price Inflation					
1 month lag	-2.510	3.322	-0.760	0.451	
2 month lag	8.186	3.982	2.060	0.042	**
3 month lag	-0.228	2.561	-0.090	0.929	
(7) Annual growth in the Yuan / USD foreign exchange rate					
1 month lag	-16.565	5.898	-2.810	0.006	***
2 month lag	28.181	12.232	2.300	0.023	**
3 month lag	-30.223	7.599	-3.980	0.000	***
(8) Annual growth in the Yuan / World foreign exchange rate					
1 month lag	-1.109	0.926	-1.200	0.234	
2 month lag	-0.043	1.350	-0.030	0.975	
3 month lag	-0.517	1.076	-0.480	0.632	
(9) Defendant indicator	0.133	0.031	4.340	0.000	***
(10) Constant	5.249	0.260	20.190	0.000	***
(11) Conspiracy indicator [b]	0.178	0.076	2.350	0.020	**

[a] Statistical significance levels: *** < 1% significance level, ** < 5% significance level, and * < 10% significance level.

[b] Conspiracy period is from January 2003 to March 2009.

Figure 2. Estimated overcharge percentage

Collusion Period	Estimated overcharge percentage
January 2003 to March 2009	19.2%

K. Dr. Warren-Boulton's market share argument overlooks other exporting markets besides the U.S. market

34. Dr. Warren-Boulton argues that "[w]ide swings in the 'market' shares of the Chinese companies exporting RGB from China during the alleged conspiracy provides additional evidence that an effective cartel did not exist."[46] To support his argument, he calculates Defendants' shares of exports to the U.S. (Exhibit 8 in the Warren-Boulton Liability Report) and claims that because "defendants' shares of exports [to the U.S.] fell substantially during the period of the alleged conspiracy," it is highly unlikely the Defendants joined a cartel "in 2003 and remained in it until at least 2009."[47] However, instead of calculating Defendants' market shares of all exports of refractory grade bauxite from China, Dr. Warren-Boulton restricts his analysis to Chinese companies' exports to the U.S. market only. Because Defendants exported to many countries besides the U.S., it is possible that they and their co-conspirators allocated the exporting market amongst each other based on geographic regions. In doing so, some companies would have higher market shares in certain countries and lower market shares in other countries at different times during the Damages Class Period.[48] By focusing on market shares in the U.S. market only, Dr. Warren-Boulton's market share analysis is wrong as a matter of economics and meaningless.

35. In fact, a file in Dr. Warren-Boulton's backup materials indicates that Defendant Bosai had a stable market share in the Chinese refractory grade bauxite exporting market during the Damages Class Period. The file shows that the ratios of Bosai's export quota to the total Chinese export quota were 14.05% in 2005, 12.37% in 2006, 12.26% in 2007, 14.29% in 2008, and 14.03% in 2009.[49]

[46] Warren-Boulton Liability Report, p. 5.
[47] Warren-Boulton Liability Report, p. 29.
[48] Market allocation can take place on a global scale. See Daniel Karon, "Collusion Central Helping Your Clients Deal with Price Fixers," *American Bar Association*, January 2002, available at http://apps.americanbar.org/buslaw/blt/2002-01-02/karon.html.
[49] See Warren-Boulton backup material 201407~1.XLS. To the best of my knowledge, defendant CMP has not provided its market share data.

III. Dr. Warren-Boulton Fails to Show His Criticisms are Material to My Conclusions, and in some Instances Does Not Incorporate His Own Criticisms in His Analyses

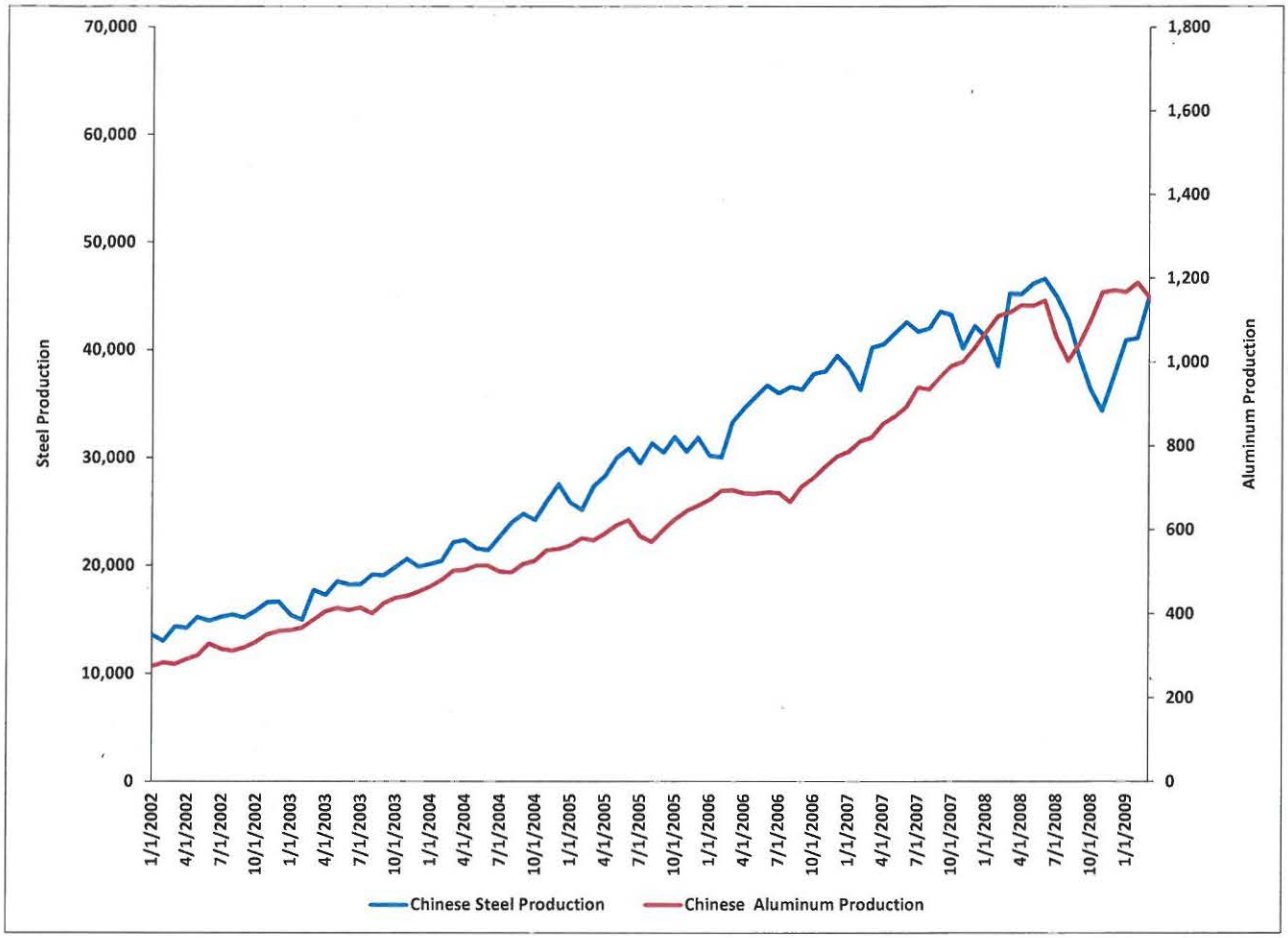
36. In some instances, Dr. Warren-Boulton criticizes my analyses without taking into account his own criticisms when building his preferred regression models. I discuss some examples below that demonstate that some of Dr. Warren-Boulton's criticisms are speculative and immaterial to my conclusions.

A. Dr. Warren-Boulton's claim that Chinese aluminum production should be included in my model is without merit

37. Dr. Warren-Boulton claims that there was an increase in the use of refractory grade bauxite by the growing domestic Chinese aluminum industry during the Damages Class Period and that this surge in demand could have affected the price of refractory grade bauxite.[50] He criticizes my model for not including this variable. However, as shown in Figure 3 below, Chinese aluminum production and Chinese steel production follow a very similar pattern. In fact, the two series are highly correlated, with a correlation coefficient of 0.933, so adding Chinese aluminum production in my regression model is redundant given that my model includes Chinese steel production to control for the domestic demand in China. In fact, Dr. Warren-Boulton fails to even account for aluminum production in any of his models.

[50] Warren-Boulton Liability Report, pp. 12-13.

Figure 3. Steel and Aluminum production in China (January 2002 – January 2009)



Source: World Steel Association, World Aluminum

B. Dr. Warren-Boulton claims my model does not take into account increased cost attributable to government-mandated technology change but fails to show it would make any difference to my analyses

38. Dr. Warren-Boulton criticizes that my model does not take into account "increased cost attributable to the government-mandated closure" of old-technology kilns (i.e., round and shaft kilns) and shift towards newer and higher cost technology (i.e., rotary kiln).[51] However, Defendants' data does not contain sufficient information distinguishing round, shaft, and rotary kilns. Among the 157 Defendant price data entries, there are only eight transactions that indicate and explicitly state the product name as round kiln bauxite, while only thirteen transactions

[51] Warren-Boulton Liability Report, p. 19.

indicate rotary kiln bauxite as the product name.[52] When I add the round and rotary kiln indicator variables to my model, the estimated coefficients of both indicator variables are statistically insignificant, while the estimated coefficient of the conspiracy indicator remains virtually unchanged.

C. *Dr. Warren-Boulton claims the Chinese export quota should be included in the regression analyses, yet he fails to include it in any of his preferred models*

39. Dr. Warren-Boulton claims that the Chinese export quota should be included in my regression model in order to separate the effect of governmental actions from any purported effect of the alleged conspiracy.[53] In his Exhibit 1, Dr. Warren-Boulton presents the Chinese export quotas from 2005 to 2012. For 2009, he divides the official Chinese export quota of 930,000 metric tons by 2 based on an argument that the Chinese government did not go through the bidding process for the second half of 2009 and therefore the quota was effectively cut in half.[54] However, the last transaction I use in my regression model is from March 2009, which is during the first half of 2009, for which the quota was 464,998 metric tons, based on Dr. Warren-Boulton's backup material.[55]

40. Figure 4 below is a corrected version of Dr. Warren-Boulton's Exhibit 1. This figure demonstrates that Chinese export quotas declined slightly from 2005 to the first half of 2009, but there were no dramatic changes during this period. Although Dr. Warren-Boulton criticizes my regression model for not including the Chinese export quota, he does not include this variable in his own models. In fact, he acknowledges in the Warren-Boulton Liability Report that "[the] export quota was in effect in five of the seven years during which Dr. Lamb assumes a conspiracy was in effect. As a result, when an indicator variable for the quota is added to the regression, the regression cannot distinguish between the effect of the alleged conspiracy and the effect of the (known and certain) quota."[56]

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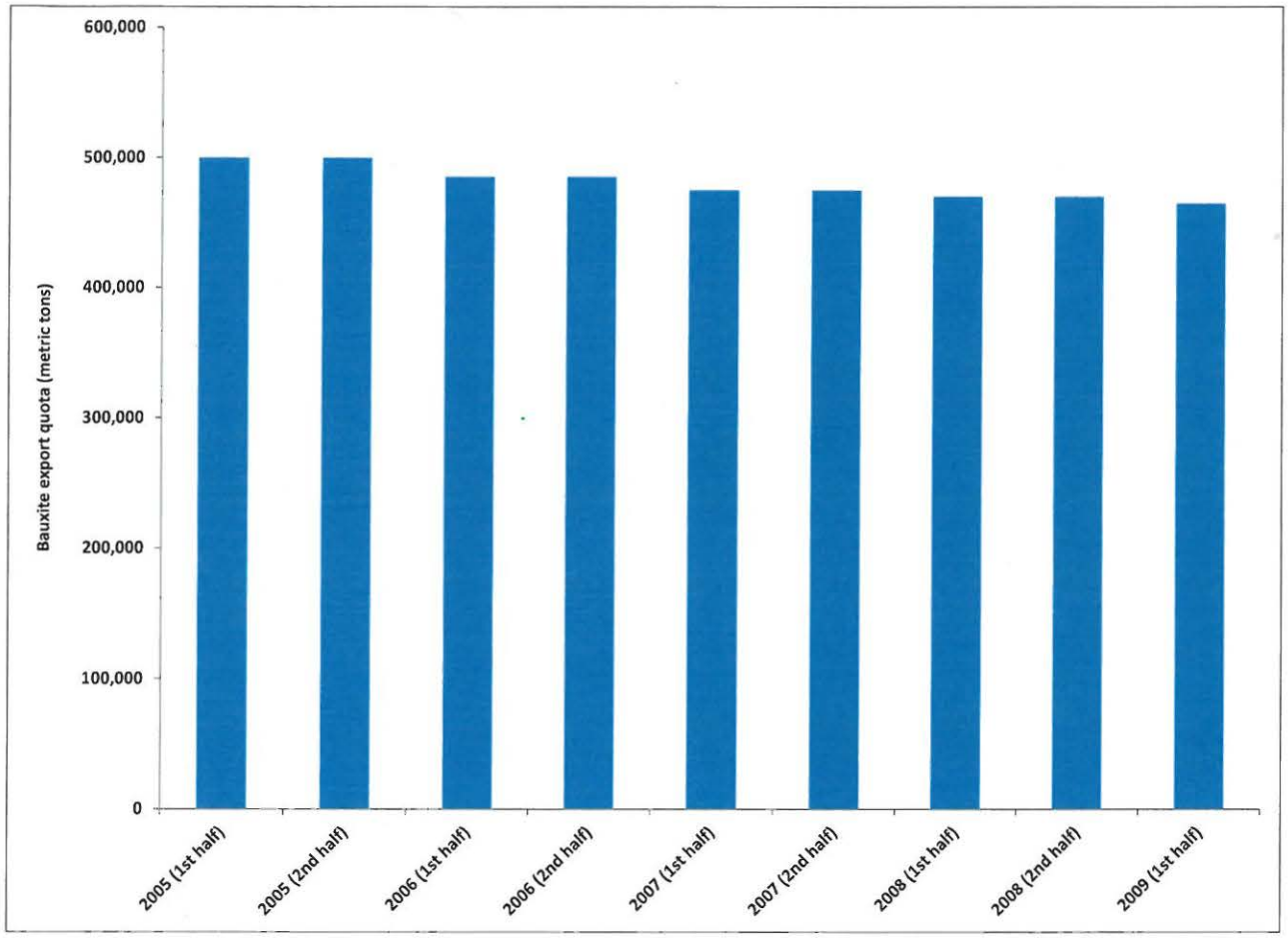
[52] See BOS_001422 - order confirmation, BOS_002445, BOS_002447, BOS_002023 - order confirmation, BOS_000266, BOS_002454, BOS_000283, BOS_002462, BOS_002443, BOS_000268, BOS_002456, BOS_002460, BOS_002427, BOS_002428, BOS_002429, BOS_002430, BOS_002431, CMP_000422, CMP_000184, CMP_000187. There is no invoice that indicates the product is shaft kiln bauxite.
[53] Warren-Boulton Liability Report, pp. 5, 13-14, 17, 24.
[54] See Warren-Boulton backup material Quota Exhibit.xlsx.
[55] See Warren-Boulton backup material 201407 1.XLS.
[56] Warren-Boulton Liability Report, footnote 47.

Figure 4. Chinese semiannual export quota of refractory grade bauxite (2005 –first half 2009)



Source: Defendant data 201407~1.XLS.

IV. Accounting for Dr. Warren-Boulton's Criticisms in My Model Yields Slightly Higher Overcharges and Proves Injury to Proposed Class Members

41. My analyses in the Lamb Damages Report establish that the prices for refractory grade bauxite exported to the U.S. market were artificially inflated generally as a result of the alleged misconduct, and that all, or nearly all, proposed class members paid these artificially inflated prices. Dr. Warren-Boulton criticizes my conclusions in this regard. I have reviewed my analyses and conclusions in light of Dr. Warren-Boulton's criticisms. As I discuss in more detail below, none of these criticisms have caused me to change my conclusion regarding the overcharge paid by proposed class members.

A. Replacing my Chinese and U.S. steel production variables with Dr. Warren-Boulton's preferred worldwide steel production variable results in higher damages

42. Dr. Warren-Boulton agrees with my use of steel production in the regression to control for demand shifts. However, he claims that I erred by not using the right measure of steel production. Dr. Warren-Boulton asserts that "worldwide steel production would offer a more appropriate measure of steel-related demand for RGB" since "RGB is exported to produce refractories for steel plants throughout the world, not just for plants in China and the U.S."[57]

43. In order to account for the possibility that worldwide steel production is a more appropriate demand shifter, I replace the variables representing Chinese and U.S. steel production in my regression with Dr. Warren-Boulton's preferred measure of worldwide steel production. To account for the fact that worldwide steel production affects demand for refractory grade bauxite with a significant lag, I use lagged values of the change in worldwide steel production over the past twelve months as explanatory variables.

44. As shown in Figure 5 and Figure 6 below, the estimated coefficient on the overcharge variable is 0.23 and statistically significant, indicating that prices paid for refractory grade bauxite were 25 percent higher than the but-for prices as a result of the alleged conspiracy.

[57] Warren-Boulton Liability Report, p. 16.

Figure 5. Using worldwide steel production instead of Chinese and U.S. steel production

Observations	155			F Statistic	79.04
Root MSE	0.3068			Prob > F	0.000
				R-squared	0.748

Explanatory variables	Coefficient estimate	Standard error	*t*-Statistic	*p*-value	Statistical significance [a]
(1) Annual growth in World Steel production					
1 month lag	1.134	1.105	1.030	0.307	
2 month lag	-3.273	1.614	-2.030	0.045	**
3 month lag	2.735	1.616	1.690	0.093	*
(2) Annual growth in Chinese purchasing price index of raw materials, fuel and power					
1 month lag	-0.718	3.058	-0.230	0.815	
2 month lag	0.339	2.544	0.130	0.894	
3 month lag	0.459	1.665	0.280	0.783	
(3) Annual growth in Chinese manufacturing labor cost					
1 month lag	-9.992	6.886	-1.450	0.149	
2 month lag	0.977	7.992	0.120	0.903	
3 month lag	3.774	5.531	0.680	0.496	
(4) Chinese total factor productivity	-0.144	0.233	-0.620	0.537	
(5) Annual growth in the Chinese Consumer Price Inflation					
1 month lag	4.141	7.060	0.590	0.559	
2 month lag	2.321	7.574	0.310	0.760	
3 month lag	-2.579	4.275	-0.600	0.547	
(6) Annual growth in the Yuan / USD foreign exchange rate					
1 month lag	-5.371	11.895	-0.450	0.652	
2 month lag	-1.063	20.739	-0.050	0.959	
3 month lag	-10.365	14.786	-0.700	0.485	
(7) Annual growth in the Yuan / World foreign exchange rate					
1 month lag	0.229	1.816	0.130	0.900	
2 month lag	-1.151	2.881	-0.400	0.690	
3 month lag	-0.323	1.618	-0.200	0.842	
(8) Defendant indicator	0.224	0.056	4.020	0.000	***
(9) Constant	5.360	0.423	12.670	0.000	***
(10) Conspiracy indicator [b]	0.229	0.102	2.260	0.026	**

[a] Statistical significance levels: *** < 1% significance level, ** < 5% significance level, and * < 10% significance level.

[b] Conspiracy period is from January 2003 to March 2009.

Figure 6. Estimated overcharge percentage

Collusion Period	Estimated overcharge percentage
January 2003 to March 2009	25.1%

B. Including export taxes on refractory grade bauxite results in positive overcharges

45. Dr. Warren-Boulton criticizes my multiple regression model for not including variables that "reflect changes in the Chinese government's tax treatment of RGB exported from China."[58] Accordingly, Dr. Warren-Boulton modifies my regression model in his Exhibit 5 to include two additional variables (i.e., the domestic price of refractory grade bauxite in China and export taxes on refractory grade bauxite), and his resulting estimated coefficient on the conspiracy indicator becomes statistically insignificant.[59] I discuss in Section II.A above why it is inappropriate to use the domestic price of refractory grade bauxite in China as a control in my regression analysis. Below I demonstrate that even accounting for export taxes in my model according to Dr. Warren-Boulton's criticism still results in positive and significant overcharges to proposed class members.

46. Dr. Warren-Boulton constructs an export tax variable using the sum of value added tax ("VAT") and export duty taxes.[60] However, Dr. Warren-Boulton ignores the fact that the Chinese CPI is based on actual expenditure which already accounts for sales taxes such as VAT.[61] This is evident from the high correlation between VAT and Chinese CPI (the correlation coefficient is 0.74). Given this fact, the only potentially relevant component of his export tax variable is export duty taxes. Accordingly, I re-estimated my original regression model to include export duty taxes as an additional control variable. These results are shown in Figure 7 and Figure 8 below. The coefficient on the overcharge variable in this model is 0.237 and statistically significant, indicating that the prices paid for refractory grade bauxite were nearly 26 percent higher than the but-for prices as a result of the alleged conspiracy.[62]

[58] Warren-Boulton Liability Report, p. 17.
[59] Warren-Boulton Liability Report, p. 25.
[60] Warren-Boulton Liability Report, Exhibit 7.
[61] See Table 1 in OECD's Methodological Notes on Compilation of G20 Consumer Price Index, available at http://www.oecd.org/std/prices-ppp/CPI-G20-methodology.pdf; also see Price Indices, Classifications and Methods, National Bureau of Statistics of China, available at http://www.stats.gov.cn/english/ClassificationsMethods/Definitions/200205/t20020517_72386.html.
[62] Moreover, summing the estimated coefficients on the lags of the manufacturing labor cost variable in Exhibit 5 of the Warren-Boulton Liability Report results in a joint effect of manufacturing labor cost on refractory grade bauxite price of -2.419. This negative sign of the joint manufacturing cost variable is inconsistent with economic theory. In

Figure 7. Including export duty taxes

Observations	155			F Statistic	96.52
Root MSE	0.30421			Prob > F	0.000
				R-squared	0.759

Explanatory variables	Coefficient estimate	Standard error	*t*-Statistic	*p*-value	Statistical significance [a]
(1) Export Duty Tax	-3.830	4.160	-0.920	0.359	
(2) Annual growth in Chinese steel production					
1 month lag	1.817	0.759	2.390	0.018	**
2 month lag	-0.711	0.619	-1.150	0.253	
3 month lag	1.619	0.788	2.060	0.042	**
(3) Annual growth in US steel production					
1 month lag	-0.592	0.728	-0.810	0.417	
2 month lag	-1.445	1.108	-1.300	0.195	
3 month lag	1.769	0.948	1.870	0.064	*
(4) Annual growth in Chinese purchasing price index of raw materials, fuel and power					
1 month lag	2.138	3.682	0.580	0.562	
2 month lag	-3.003	2.744	-1.090	0.276	
3 month lag	0.635	1.793	0.350	0.724	
(5) Annual growth in Chinese manufacturing labor cost					
1 month lag	-10.725	7.634	-1.400	0.162	
2 month lag	11.450	7.833	1.460	0.146	
3 month lag	2.035	6.624	0.310	0.759	
(6) Chinese total factor productivity	-0.772	0.553	-1.400	0.165	
(7) Annual growth in the Chinese Consumer Price Inflation					
1 month lag	4.346	8.299	0.520	0.601	
2 month lag	6.181	8.472	0.730	0.467	
3 month lag	-7.129	4.776	-1.490	0.138	
(8) Annual growth in the Yuan / USD foreign exchange rate					
1 month lag	5.259	13.556	0.390	0.699	
2 month lag	-9.768	20.357	-0.480	0.632	
3 month lag	-9.379	14.600	-0.640	0.522	
(9) Annual growth in the Yuan / World foreign exchange rate					
1 month lag	-1.179	1.908	-0.620	0.538	
2 month lag	-1.693	2.785	-0.610	0.544	
3 month lag	-0.324	1.599	-0.200	0.840	
(10) Defendant indicator	0.210	0.055	3.860	0.000	***
(11) Constant	4.785	0.681	7.020	0.000	***
(12) Conspiracy indicator [b]	0.237	0.113	2.090	0.038	**

[a] Statistical significance levels: *** < 1% significance level, ** < 5% significance level, and * < 10% significance level.

[b] Conspiracy period is from January 2003 to March 2009.

contrast, when the export tax variable is treated correctly (as I discussed above), as Figure 7 demonstrates, the sum of the lags on the manufacturing cost variable has a positive sign and is therefore consistent with economic theory.

Figure 8. Estimated overcharge percentage

Collusion Period	Estimated overcharge percentage
January 2003 to March 2009	25.9%

47. As demonstrated above, it is my opinion that proposed class members were overcharged on their purchases of Chinese refractory grade bauxite, even after accounting for Dr. Warren-Boulton's criticisms regarding the appropriateness of the steel production variables and the inclusion of export taxes.

V. Conclusions

48. I have reviewed the Warren-Boulton Liability Report. In particular, I consider his criticisms of my analyses in order to determine if any of those criticisms cause me to change the opinions that I reached in the Lamb Damages Report. I discuss above the flaws in Dr. Warren-Boulton's analyses and opinions. Based on my review of the Warren-Boulton Liability Report, my previous analyses and research on the market for refractory grade bauxite, and my training and more than 20 years of experience in economics and econometrics, I reaffirm the conclusions set forth in the Lamb Damages Report.

49. In particular, I reaffirm my conclusions that 1) all proposed class members were injured as a result of the Defendants' alleged misconduct; 2) the estimated damages owed to proposed class members for their total imports are $27.47 million before trebling; and 3) the estimated damages that are attributable to the two Defendants, Bosai and CMP, are $2.46 million and $2.19 million, respectively, before trebling.

50. In addition, although I believe the multiple regression analyses in the Lamb Damages Report to be sound, I consider Dr. Warren-Boulton's criticisms and incorporate these criticisms into my multiple regression analyses when appropriate. Doing so yields an overcharge that is higher than the one that I present in the Lamb Damages Report, thus affirming that my damages estimate is conservative.

I declare under penalty of perjury that the foregoing is true and correct. Executed this 15th day of December, 2014, at Arlington, Virginia.

Russell L. Lamb, Ph. D.

Exhibit C

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF PENNSYLVANIA

RESCO PRODUCTS, INC., Plaintiff,	
vs.	Case No.: 2:06-cv-235-JFC
BOSAI MINERALS GROUP CO., LTD., CMP TIANJIN CO., LTD., Defendants.	

Washington, D.C.
Friday, February 13, 2015

Videotaped Deposition of:

DR. RUSSELL L. LAMB,

called for oral examination by counsel for Defendants, pursuant to notice, at the office of Garvey Schubert Barer, 5th Floor, 1000 Potomac Street, Northwest, Washington, D.C., before Michelle Taylor, of Esquire Deposition Solutions, a Notary Public in and for the District of Columbia, beginning at 9:05 a.m., when were present on behalf of the respective parties:

A P P E A R A N C E S

On behalf of Plaintiff:

AUGUST HORVATH, ESQUIRE
Kelly, Drye & Warren, LLP
101 Park Avenue
New York, New York 10178
(212) 808-7528

On behalf of Defendants:

SEAN S. GRIFFIN, ESQUIRE
BENJAMIN J. LAMBIOTTE, ESQUIRE
Garvey Schubert Barer
1000 Potomac Street, Northwest
5th Floor
Washington, D.C. 20007
(202) 298-1791

ALSO PRESENT:

Noojan Ettehad, Videographer

* * * * *

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(* Exhibits attached to transcript.)

P R O C E E D I N G S

THE VIDEOGRAPHER: Good morning. This the is video deposition of Dr. Russell -- I'm sorry the last name is, how do you --

MR. LAMBIOTTE: Lamb.

THE WITNESS: Lamb.

THE VIDEOGRAPHER: -- Lamb. In the matter of Resco Products, Inc., versus Bosai Minerals Group, in the U.S. D.C. for the Western District of Pennsylvania.

This deposition is being taken in Washington, D.C. on February 13, 2015, at 9:06 a.m.

My name is Noojan Ettehad and I'm the videographer. The court reporter today is Michelle Taylor. Will the counsel please introduce themselves.

MR. GRIFFIN: My name is Sean Griffin, counsel for defendant Bosai.

MR. LAMBIOTTE: Ben Lambiotte, also for the defendant. And we're both of the law firm of Garvey Schubert Barer.

MR. HORVATH: August Horvath, from the firm of Kelley, Drye & Warren for Resco in the plaintiff

class.

THE VIDEOGRAPHER: Thank you. The court reporter can swear in the witness now.

WHEREUPON,

DR. RUSSELL L. LAMB,

called as a witness, and having been first duly sworn, was examined and testified as follows:

EXAMINATION BY COUNSEL FOR DEFENDANTS

BY MR. GRIFFIN:

Q Can you state your name, please.

A Russell Lamb.

Q And where do you live?

A I live in Fairfax, Virginia.

Q And I'm here -- I understand that you are a plaintiff's testifying expert in this case, correct?

A That's correct.

Q What subjects do you propose to testify in the trial of this matter?

A Well, I've been asked to prepare a report on damages to the plaintiff class. And I prepared two reports on that matter; one original report, and then in response to the report of Dr. Warren-Boulton.

Q Okay. You said you were expecting to testify as to damages; is that right?

A That was the assignment that I was given in preparing the analysis that's contained in my report, yes.

Q So is it correct to say that you're not testifying as to liability?

A As I discuss in my expert reports, I have assumed liability in this matter. That is I've assumed that the alleged misconduct that's found to have occurred, and then I analyzed the question of damages arising from that alleged misconduct.

Q Okay. I just wanted to get an idea of the subjects on which you proposed to testify. So is it accurate to say that your report does not purport to help the finder of fact decide whether the allegations of the complaint are true or false; is that right?

MR. HORVATH: I object to the form of the question.

You can answer.

THE WITNESS: Well, I think by nature of the fact that I've assumed liability that I -- I -- it's

clear I'm not analyzing the question of liability. It's an assumption in my report; that's correct.

MR. GRIFFIN: Okay. I do not propose to actually mark this as an exhibit unless you really want me to. But this is the original report, I'll just hand this to you for you -- do you -- I assume you have a copy.

MR. HORVATH: I do. I -- let me give it to you. I presume you're going to be questioning on this quite extensively.

MR. GRIFFIN: Yes. Do you need a copy?

MR. LAMBIOTTE: Here. Here.

MR. HORVATH: No, I -- it's just an issue of marking it as a report. I really think you should do that if you're going to question on it.

MR. GRIFFIN: Yeah, I agree. Let me -- you can mark that as an exhibit then, okay. Do you have another copy?

MR. HORVATH: I do have another copy so you don't need to provide.

MR. GRIFFIN: Okay.

(LAMB Exhibit Numbers 1 and 2 were

doing the econometric analysis that I did here.

BY MR. GRIFFIN:

Q But --

A Because neither -- neither Dr. Warren-Boulton or I had a different variable on -- on the of the cost of the licenses other than the -- the tax which I have already talked about and of course the quota of quantity itself. But if you properly control for the quota quantity in contrast of Dr. Warren-Boulton's misunderstanding, it doesn't result in any change in the overcharge other than to make the overcharge a little bit higher than what my analysis measures.

Q Okay. My question is much simpler than that. My question is: Do you have an opinion as to whether bauxite export are to be calculated by taking the sum of the FOB bauxite cost, plus the cost of the export license, then adding the VAT and finding the 15 percent export duty?

MR. HORVATH: Objection to the form.

THE WITNESS: Well, I -- first of all, the -- what the writer states here in that sentence is missing a word or two because he says bauxite exports

The only contract for which I had price data was March 2009. Well, naturally the elimination of quota in the second half of 2009 can't affect the price of contract in March of 2009. It's that kind error in his analysis that causes Dr. Warren-Boulton to reach these erroneous collusions.

BY MR. GRIFFIN:

Q Do you know whether the Chinese export quota was binding or not?

A At what point in time over what period?

Q From 2002 to 2009?

A Well, Dr. Warren-Boulton apparently thinks that it wasn't binding before 2005.

Q Do you know --

A So that was -- that would be one reason that I probably didn't conclude it in my multiple regression analyses. When I took account of the data that he provided on export quota 2005, 2009 properly corrected for the 2009 issue, there's no effect on -- pardon me. The overcharge is still statistically significant and positive. It's not really very much of a change if you look at the change in the quota

that Dr. Warren-Boulton talks about in his report, once you correct his error with respect to 2009. So there may have been some year in which the quota restriction was binding, I haven't analyzed that year by year, period by period, but I have looked at my econometric analysis my multiple regression analyses, and conducted sensitivity analyses in the light of Dr. Warren-Boulton supplemental report and I found that the overcharge is still positive and statistically significant even if I include the quota as a variable in my multiple regression analyses.

Q Do you know whether the Chinese export quota was binding or not?

MR. HORVATH: Objection.

THE WITNESS: I would ask again, over what timeframe?

BY MR. GRIFFIN:

Q Do you know whether the Chinese export policy was binding or not from 2002 to 2009, or any period in between?

A I don't believe it was binding throughout 2002, 2009, no.

China, that's true, I wouldn't have done that.

BY MR. GRIFFIN:

Q Okay.

A But -- but the real -- I mean the answer to this question is, I wouldn't have gone through any of that analysis because when I actually attempted properly in my damages analysis to measure the effective the alleged misconduct on price in the marketplace for refractory grade bauxite, controlling from any possible effect from changes of quota policy, I didn't find any effect that reduced my measure of damages in a way I thought I needed to take account of. There are a couple of ways I did that, Dr. Warren-Boulton improperly attempted reported to measure the effect of quota policy in regression analysis in which he threw out the cartel variable and included a quota indicator variable, that's the wrong way to do it. I corrected that methodology and I find that the quota indicator variable is not statistically significant but the cartel indicator variable is. And then I also did a regression analysis where I included the level of the quota and I find no effect from the

level of the quota I find that overcharge is still positive and statistically significant. There is no, I believe, no significant -- significant effect of the quota. But in any case the overcharge variable is positive and statistically significant. So I looked at this question in some detail and found that Dr. Warren-Boulton's criticism by model respect to the quota in any case are incorrect. But as I said I believe there is evidence in the record respective to the manipulation of the quota by the defendants and their alleged coconspirators.

Q Do you know what the penalty is for violating Chinese export quota policy?

A I don't. As I sit here today, no, I don't. It wasn't relative to my assignment in this matter.

Q I just want to make clear, when you say that the Chinese export policy was not binding, you're not saying that Bosai could have exported refractory grade bauxite in excess of the Chinese export quota, right?

MR. HORVATH: Object to the form.

THE WITNESS: That's the dif -- well, you're saying is could they have smuggled bauxite, that's a

purpose of that exhibit is to say that Dr. Warren-Boulton's argument that there's a -- I think the word he use was a dramatic decline in the quota, is not accurate over the time period for which I was measuring damages. I think that -- what my figure 4 establishes is that if you look at the second -- the first half of 2009, the quota is essentially the same, it's only the second half of sales are sort of curtailed completely. And then it looks like the quota for the year has dropped by 50 percent, and I think that's not the right way to read the data.

The further point which is -- which is made in Paragraph 39 and 40 above is that it isn't necessary or appropriate to include the quota as an explanatory variable in -- in the model. I have under taken sensitivity analysis to look at that question two different ways, I've have talked about this already. The first is to include a quota indicator variable which takes the value, one, during this period 2005 to 2009, that Dr. Warren-Boulton says the quota would have result in a large increase in the

price in the marketplace and zero elsewhere.

And to add that to my multiple regression analyses, and when I do that I find that the quota variable is not statistically significant of my overcharge variable is. And then I also included the level of the quota as an indicator variable -- pardon me, as a variable in my multiple regression analyses. And, again, I confirm that the -- the overcharge -- I think the overcharge goes up slightly when you do that exercise.

So I -- I have analyzed the question that Dr. Warren-Boulton raises. I think he is misinterpreting what's going on with the quota. The point of the graph is really -- figure four is really just to point out that I think he misinterpreted what's happening with the quota during that time period.

Q What do you mean overcharge variable?

A The indicator variable in my multiple regression analyses which measures the overcharge in the market place arising from the alleged misconduct.

Q And your opinion is that the overcharge

analysis in which he uses the domestic price during the damage period as a variable to control or explain what's going on in the export market. For a number of reasons, the first is that the -- as I indicated in my supplemental report that the fact that if there's a cartel amongst suppliers which is fixing the price in the export market, one would certainly suspect that it's fixing the price in the domestic market especially because of during most of the class period -- pardon me, the damages period, it wasn't illegal to fix price, there's no antimonopoly or anti cartel laws in China as I understand it.

And then, secondly, because why would you not try to control supply to the domestic market and raise price in domestic market if you're doing it for the export market. But further the problem with the relation between domestic price and export price that Dr. Warren-Boulton hypothesizes is that he ignores the fact if all of the export bauxite were shifted to the domestic market that would push the price in domestic market down. And he's failed to account for that in his analysis.

puts forward was appropriate or not based on the alleged misconduct in this matter and what he should have looked at in terms of the domestic market for refractory grade bauxite.

Because I -- in some ways -- I guess what I'm -- what I'm trying to say is, I didn't put forward the variable as an explanatory variable. Dr. Warren-Boulton did, very -- I think in a very misguided analysis. And in all, I'm pointing out is that given the allegations in this matter and the exercise which gives rise to this -- this multiple regression analyses to put forward or purport to use the domestic prices in an explanatory variable is -- is wrong as a matter of economics in econometrics.

Q Did you consider the increase in price, the domestic price of refractory grade bauxite in your analysis?

A Did I consider it. It wasn't one of my control variables in my damages analysis, it wouldn't have been appropriate to include it there.

Q So you did not consider it; is that right?

MR. HORVATH: Objection.

BY MR. GRIFFIN:

Q Sorry. You did not consider it?

A No, I would say I considered it as preposterous and an indication of the degree to which Dr. Warren-Boulton was results driven in conducting these purported econometric analyses is. To put forward such an exercise is contrary to any sound econometric or economic practice that I've ever seen that I was -- frankly I found it among the most stunningly inappropriate analyses I've ever seen in a litigation report, expert report.

Q Did you control --

A It just doesn't -- it just doesn't make any sense. I considered it when I saw it in Dr. Warren-Boulton's report, and I considered it to be extraordinarily inappropriate for the purposes that he used it.

Q So you did not control for the increase in domestic refractory grade bauxite prices within China?

A I did not control using the domestic price which would have been determined by the same suppliers who are alleged to have cartelized the export market.

Q Well, let me just ask the question this way then.

A I -- I --

Q Do you know -- you testified earlier you don't know how much of the domestic refractory grade bauxite supply that the alleged coconspirators accounted for; is that right?

A I testified that already and I didn't --

Q And so the alleged --

A Well, let me -- pardon me, let me finish the answer, I need a minute here. It wasn't necessary for me to investigate that question in order to understand that Dr. Warren-Boulton's use of the domestic price was flawed. It was flawed for one thing because of the allegations and misconduct in the export market. But as I just testified a moment ago, it's further flawed because he's assumed that one can shift export sales to the domestic market without any effect on the domestic market price. That's the assumption, assertion really, that he makes in claiming that the domestic prices then quote, what he calls, quote, the opportunity cost --

Q What --

A -- of the -- let me finish please, of the export market sales. For either of those reasons, his analysis for using the domestic price is simply improper as a matter of econometrics. So I didn't put forward the idea of using the domestic price. I don't think any competent econometric analysis would be based on it in this context, and I think Dr. Warren-Boulton's assertions to the contrary, notwithstanding his analysis, is fatally flawed with respect to that use of that variable.

Q Okay. It's very important for you to focus on my next few questions so you can answer just those questions, then we can move on. You said earlier that it was the same supplier as selling the refractory grade bauxite domestic within China as well as exporting, do you remember that testimony?

MR. HORVATH: I object.

THE WITNESS: I don't believe I said that. I think I said some of the same.

BY MR. GRIFFIN:

Q Okay. And you don't know whether how much of

the refractory grade bauxite production output is accounted for by the alleged coconspirators in this case, you said that remember?

A For domestic consumption or export consumption?

Q Domestic.

A I think that's what I testified to, yes.

Q So if you alleged that the coconspirators were fixing prices domestically of refractory grade bauxite don't they have to have enough of a market share for their conspiracy to make a difference?

A They -- they would potentially be able to influence that price if they're selling enough into the export market and they don't sell anything at the point in time when they form the cartel in the domestic market. But they restrict output enough into the export market and that supply then comes onto the domestic market. So you're trying to, and I understand what you're trying to do to get a bullet point out of what is really a much more complicated question than that. But I just will go back to what I said already two or three times today is, I concluded

that Dr. Warren-Boulton's use of domestic price was inappropriate as a matter of econometrics and economics for a variety of reasons that I talked about two important reasons. And I wouldn't have ever put forward that method as a way of measuring or modeling price here for the purpose of measuring the overcharges, it's just a fatally flawed approach.

Q But you just said you didn't know how much of the domestic refractory grade bauxite prices the alleged coconspirators accounted for. If that is the case then how do you know whether they could have affected the domestic market or not?

A Well, if they controlled the export market, and they divert enough supply off the export market, even if they had -- even if they didn't sell anything into the domestic market at the time -- at the time the alleged misconduct began. If the effect of the alleged misconduct is to take product out of the export market and make it available to the domestic market, that's going to potentially have an effect on the domestic market.

Q Do you have any evidence that that happened?

MR. HORVATH: Great idea though. I think maybe it will end the complaint. Thanks for that.

BY MR. GRIFFIN:

Q The -- the closing of the -- let me take a step back. Did you investigate whether the closing of the kilns as described in this paragraph increased the price of refractory grade bauxite within China, calcined refractory grade bauxite?

A No, I haven't even seen any data on -- hard data of the closing of kilns that would allow you to understand anything about the effect, I haven't seen that.

Q Can we agree that if a sufficient number of refractory grade bauxite kilns in China were closed, that would increase the price of calcined refractory grade bauxite within China?

MR. HORVATH: I object to the form.

THE WITNESS: Not necessarily. It depends on what the other -- what other kilns would have sprung up to have met that demand. Possibly you close one kind and another kind springs up and supplies it, it doesn't make any difference at all of the price.

CERTIFICATE OF NOTARY PUBLIC

I, Michelle Taylor, the officer before whom the foregoing deposition was taken, do hereby certify that the witness whose testimony appears in the foregoing deposition was duly sworn by me; that the testimony of said witness was taken by me in stenotype and thereafter reduced to typewriting under my direction; that the said deposition is a true record of the testimony given by said witness; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this deposition was taken; and further, that I am not a relative or employee of any counsel or attorney employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

Michelle Taylor
Notary Public in and for the
District of Columbia

My commission expires:
July 14, 2017

Exhibit D

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF PENNSYLVANIA

RESCO PRODUCTS, INC., Plaintiff, v. BOSAI MINERALS GROUP CO., LTD, & CMP TIANJIN CO., LTD Defendants	)	Civil Action No.: 2:06-cv-235-JFC

Expert Report of Frederick R. Warren-Boulton
Concerning Liability

November 13, 2014

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EXECUTIVE SUMMARY

Plaintiff's damage expert, Dr. Russell Lamb, concludes his report with the assertion that he has "determined that all class members were injured as a result of the alleged conspiracy, in that they paid higher prices than they would have paid but for the alleged conspiracy." This language suggests that Dr. Lamb's damage analysis can serve to help establish antitrust liability; *i.e.*, that a conspiracy among Chinese exporters of refractory grade bauxite actually existed from 2003 through 2009 and that defendants participated in that conspiracy. Nothing could be further from the truth. Dr. Lamb's analysis cannot serve as evidence that a conspiracy existed for at least three fundamental reasons.

First, his damage analysis is critically flawed and completely unreliable for a variety of reasons, including its failure to take account of Chinese government mandated export controls, Chinese government taxes and fees on exports, and various other factors (*e.g.*, an approximate doubling of inland transportation costs in 2004 and the government-mandated closure of many calcining facilities used in the manufacture of refractory grade bauxite) that affected the quantity and cost of exports. In other words, the analysis offered by Dr. Lamb does not attempt to identify the effect of any alleged conspiracy over and above Chinese government mandated export controls or Chinese government taxes and fees on exports. Further, because Dr. Lamb has measured the effect of any conspiracy as a "residual," any effect that should have been attributed to a factor which he does not take into account (*e.g.*, quotas), or any error in the estimated effect of variables that he does take into account, will impact his estimate of the alleged conspiracy's effect. Not surprisingly, therefore, when his analysis is refined to take account of factors he has ignored it fails to produce an estimated price effect that could be attributable to the alleged conspiracy. A separate, more straightforward regression analysis which uses a small number of independent variables to take account of changes in the demand for and costs of RGB exports from China confirms that any alleged conspiracy did not affect defendants' prices.

Second, Dr. Lamb's analysis is based on the assumption that a conspiracy existed and that it began on or about January 1, 2003, but not earlier. If Dr. Lamb had instead assumed that the conspiracy started on or before January 1, 2002, his "before/after January 1, 2003" approach would not allow him to even test for any effect of such a conspiracy. Thus, the validity of the analysis depends on the alleged conspiracy actually having begun around January 1, 2003 and not before or after that date. If the alleged conspiracy began by January 1, 2002 or earlier, then

none of Dr. Lamb's estimated price effect can be due to a conspiracy and instead must be the result of other factors unaccounted for by Dr. Lamb.

Third, it is extremely implausible that a company would participate in a conspiracy to raise price if participation in that conspiracy caused the company to lose all, or a very large share, of its sales. Dr. Lamb's own data indicate that each defendant's share of Chinese refractory grade bauxite exports to the U.S. declined dramatically after the alleged conspiracy began. Bosai's share fell from 74.5 percent in 2003 to zero percent in 2009, while CMP's share fell from 19.4 percent to 2.2 percent over the same period. Dr. Lamb's conclusion that the defendants participated in a conspiracy complete ignores this evidence that their alleged participation would have been against their own interests.

Based on the documents and other information provided in this case, as well as my own research, I have come to the following conclusions:

- Dr. Lamb's regression model for estimating the effect of the alleged conspiracy on the price of RGB exported from China takes no account whatever of important factors that affected the supply of those exports, including changes in the Chinese government's export quotas and its tax policies for exports;
- None of the independent variables in Dr. Lamb's regression model adequately reflect changes in factors affecting the cost of supplying RGB, such as prices for raw materials and labor specific to that commodity as well as the cost of inland transportation;
- None of the independent variables in Dr. Lamb's regression model adequately account for shifts in the demand for RGB over the relevant period;
- Including just two appropriate independent variables in Dr. Lamb's regression eliminates any price effect related to the alleged conspiracy;
- Dropping one statistically insignificant variable in Dr. Lamb's regression, total factor productivity, reduces the estimated conspiracy effect by one third, and renders it statistically insignificant, thus providing just one example of how Dr. Lamb's "residual" methodology can attribute error in estimating variables to a "conspiracy" effect;
- A separate, more straightforward regression analysis which uses a small number of independent variables to take account of changes in the demand for RGB as well as the supply of exports from China confirms that the alleged conspiracy did not affect defendants' prices; and
- Wide swings in the "market" shares of the Chinese companies exporting RGB from China during the alleged conspiracy provides additional evidence that an effective cartel did not exist.

I. QUALIFICATIONS AND ASSIGNMENT

My name is Frederick R. Warren-Boulton. I am an economist and Principal with MiCRA, an economics consulting and research firm with offices at 1155 Connecticut Avenue, N.W., Washington, D.C. I received a B.A. degree from Yale University, a M.P.A. from the Woodrow Wilson School of Princeton University, and a Ph.D. in Economics from Princeton University. From 1972 to 1983 I was an Assistant and then Associate Professor of Economics at Washington University in St. Louis. From 1983 to 1989, I served as the chief economist for the Antitrust Division of the U.S. Department of Justice ("DOJ"), first as Director of its Economic Policy Office and then as Deputy Assistant Attorney General for Economic Analysis. Since leaving the government, I have served as a Resident Scholar at the American Enterprise Institute, a Visiting Lecturer of Public and International Affairs at the Woodrow Wilson School at Princeton University, and as a Research Associate Professor of Psychology at the American University. As a principal at MiCRA, I have served as an expert witness or consultant on a large number of antitrust matters, including as an expert witness for the Federal Trade Commission ("FTC") in *FTC v. Staples and Office Depot*, for the States and the Department of Justice ("DOJ") in *United States v. Microsoft* and, most recently, for the DOJ in *United States v. H&R Block*. A copy of my resume is attached as Appendix A to this report.

Plaintiff in this case alleges a conspiracy among defendants and their competitors "with the purpose and effect of fixing prices and controlling the supply of refractory grade bauxite …to inflate the prices of refractory grade bauxite sold to plaintiff and other purchasers in the United States and elsewhere."[1] Specifically, Plaintiff alleges that beginning no later than January 1, 2003 and continuing through at least mid-2009, Chinese producers of refractory grade bauxite ("RGB") conspired to raise the price of RGB exported to the U.S and elsewhere.[2] Plaintiff has retained Dr. Russell Lamb as an economic expert.

I have been retained by counsel for defendants Bosai Minerals Group Co., Ltd ("Bosai") and CMP Tianjin Co., Ltd in the above-captioned case to: (1) review and comment on the September 29, 2014 "Expert Report Concerning Damages" submitted by Dr. Lamb (hereafter, "Lamb Report") and (2) determine whether Dr. Lamb's report provides any empirical evidence

[1] First Amended Complaint ("FAC"), ¶ 1.

[2] *Ibid*, ¶ 2.

that there was an alleged conspiracy that raised prices or restricted exports of RGB exported from China for delivery in the United States.

In the process of preparing this report my staff and I have considered the relevant economics literature as well as data and documents produced in this case, and other relevant data concerning the sale and export of RGB. Information sources are cited herein or listed in Appendix B.

It is my intention to review any new material that may become available, including any supplementary response Dr. Lamb may submit in response to this report, and, if appropriate, to revise or supplement this report in light of that material. MiCRA is being compensated for my services in this matter at the rate of $700 per hour.

II. BACKGROUND AND SUMMARY OF OPINIONS

The relevancy of Dr. Lamb's report to the possible liability of defendants is questionable in light of the assumptions underlying his analysis. It appears that Dr. Lamb was not asked to analyze whether there is economic evidence which could suggest the existence of the alleged conspiracy, but rather to assume the existence of the conspiracy as well as defendants' participation in that conspiracy and, based on those assumptions, to determine class-wide damages by estimating the amount by which the alleged conspiracy alone raised the prices paid by U.S. customers.[3] In pursuing that assignment, he also chose to assume both that the conspiracy began on January 1, 2003 and that the alleged conspiracy was equally effective throughout the entire damage period (*i.e.*, it raised price by exactly the same percentage amount each year from 2003 through at least 2009). Thus, its utility in determining whether there were any effects on prices consistent with the existence of a conspiracy is questionable because, among other things, the results of his analysis are critically dependent on the date the alleged conspiracy is assumed to have started. For example, if the assumed start date was on or before January 1, 2002, his model cannot be used to discern if the alleged conspiracy had any effect on prices of RGB exported from China for deliver to the U.S.[4]

[3] Lamb report, p. 4. In preparing this report I have addressed directly the question of whether there is economic evidence indicating the effect of a conspiracy which might indicate liability of defendants for participation in a conspiracy in violation of the Sherman Act. I reserve the opportunity to analyze the question of whether there was any damage incurred by U.S. customers for a later date if and when the question of damages arises.

[4] Dr. Lamb uses a model which estimates overcharges by comparing the price of RGB before the alleged conspiracy to the price during the alleged conspiracy. Note that the plaintiff asserts that the alleged conspiracy "has existed at

Even viewing the Lamb report as relevant to questions of liability, its accuracy is fatally undermined by its failure to identify any economic effects of the alleged conspiracy "over and above" the effects of Chinese governmental actions (which are unaccounted for in his analysis), and by other errors. Between 2002 and 2009 several factors substantially affected the cost of producing RGB in China, the export demand for RGB, and the quantity of that product available for export. As discussed below in Section III, Dr. Lamb entirely ignores all or most of these factors and also uses data that are clearly unequal to the task to try to take account of several other factors. As a result, his calculations fail to provide any evidence that export prices were inflated by any conspiracy between 2003 and 2009.

RGB is produced by calcining (*i.e.*, heating to very high temperatures) bauxite ore that is unusually rich in aluminum oxides and then processing (*i.e.*, crushing or grinding) the calcined material to a specific size. In China, many firms participate at each stage of production. Bauxite ore used to produce RGB is mined by multiple companies;[5] is calcined in rotary, shaft, and round (or "beehive") kilns by a many companies; and is processed (*i.e.*, crushed and packaged) and exported by a substantial number of companies.[6] It is my understanding that both Bosai and CMP purchased the calcined bauxite from suppliers and processed it in accordance with purchasers' specifications before exporting it. Neither defendant mined the bauxite ore which served as the raw material for the RGB it exported.

By controlling the quantity of exports, through quotas and taxes assessed on exports, and by restricting the technology that can be used to supply RGB, the Chinese government has directly or indirectly intervened in the market for RGB exports in ways that economics teaches can be expected to impact the price of RGB exported from China, and all of which Dr. Lamb

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least during the period from January 1, 2003 to date." (FAC, ¶ 2. In short, according to the plaintiff it began no later than January 1, 2003. If the conspiracy began by January 1, 2002 or earlier, then none of Dr. Lamb's estimated price effect can be due to a conspiracy and instead must be the result of other factors unaccounted for by Dr. Lamb, such as those discussed below, or errors in estimating the effect of factors he did take into account. Thus, unless there is evidence of collusive conduct (*e.g.*, agreements) which occurred in 2003 that did not also occur in 2002, Dr. Lamb's methodology is incapable of providing empirical support for finding that a conspiracy ever affected export prices.

[5] Alison Tran, "Quest for calcined bauxite," *Industrial Minerals* ("*im*") March 2007, p. 35.

[6] See, for example, Jessica Roberts, "China's bauxite blockade, "*im,*" July 2009, p. 44 ("export licenses are allocated proportionately to myriad small companies…"). See also FAC, ¶ 34, noting that the number of Chinese companies that exported RGB over the relevant period declined from an estimated 62 in 2002 to 15 or 20 by 2009. I understand that many firms which supply RGB to Chinese customers do not also export RGB, *i.e.*, the total number of firms in China that supply RGB substantially exceeds the number of firms that export RGB.

ignores. China imposed a fixed quota on the export of calcined bauxite used for refractories from 2005 through 2012.[7] As shown in Exhibit 1, that quota declined significantly between 2005 and 2009 (*i.e.*, over most of the period covered by Dr. Lamb's damage analysis), falling most sharply in 2009, when it was eliminated entirely for the second half of the year.[8] (In 2010, the quota climbed much of the way back to the 2008 level.)

Plaintiff ostensibly recognizes that the Chinese government's quota can be expected to restrict the quantity of RGB exported from China, and contends that

> To the extent that the government of China imposes …mandatory export controls, and to the extent such mandatory export controls have impacted export prices of refractory grade bauxite, the voluntary cartel has had, and continues to have, an effect on prices that is separate and distinguishable from the effects of such government mandated export controls.[9]

Thus, plaintiff further states that it "expects to prove at trial the fact and amount of an effect on export prices caused by the actions of the voluntary cartel that is separate and distinguishable from the effects of any such government-mandated export controls."[10] Remarkably, however, Dr. Lamb makes no effort whatever to take account of, or separate, the effects of the quota from other supply and demand factors that affected prices over the relevant period.

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[7] China's central government adopted an export license system as early as 1994 "to enable stricter control of export volumes and prices, reduce smuggling, and minimize allegations of dumping." In years immediately prior to 2005, RGB exports "were subject to a flat fee of RMB230 (US$28)/t, but in 2005 the system changed to the notorious bidding and quota system…" See, Mike O'Driscoll, "International Trade in Industrial Minerals," p. 57 at www.segmar.gov.ar/bibliotecaintemin/LIBROSDIGITALES/Industrialminterals&rocks7ed/pdffiles/papers/004.pdf. See also MOFTEC Wai Jing Mao Fa No. 626 Notice of Printing and Issuing the Implementing Rules of Export Quota Bidding for Industrial Products, November 2001; MOFTEC, Order No. 11, Measures for the Invitation of Bid for Export Commodity Quotas, December 2001; MOFTEC, Order No. 12, Measures for the Administration of Export Commodities Quotas, December 2001, MOFTEC, Order No. 28, Measures for the Administration of License for the Export of Goods, December 2004. See also WTO, China –Measures Related to the Exportation of Various Raw Materials DS394, DS395 & DS398 – First Written Submission of the United States, ("WTO Raw Materials Case, USTR 1st Submission") June 1, 2010, at 28-51. As a result of a WTO treaty dispute resolution case brought by the U.S. Trade Representatives, which determined that RGB and other export quotas imposed by China were inconsistent with China's treaty obligations, China repealed the quota in 2012. See also WTO, China –Measures Related to the Exportation of Various Raw Materials DS394, DS395 & DS398, Status Report by China Addendum, January 17, 2013. I understand that a single quota applied to forms of calcined bauxite within Customs Code 2508300. While the term "calcined bauxite" includes both RGB and bauxite used for abrasives, the two materials have different chemical compositions. However, "consumers of abrasive grade bauxite often compete with consumers of refractory grade bauxite for the same supply sources in China. (Alison Tran, *op. cit.*,9. 40)..

[8] See, for example, Jessica Roberts, *op. cit.* p. 40.

[9] Plaintiff's More Definite Statement as to Paragraph 61 of the First Amended Complaint.

[10] *Ibid*.

Export taxes and fees are a second element of cost controlled by the Chinese government, and its tax treatment of RGB exports changed significantly over the relevant time period. Dr. Lamb also takes no account of tax-related factors, which include the following:

- Prior to 2003, the Chinese government rebated to producers that exported bauxite a 13 percent VAT levied on export sales.[11] The rebate was eliminated in late 2003, resulting in a significant increase in the cost and f.o.b. price of exports in 2004;[12]

- In 2009, the VAT on exports was increased from 13 percent to 17 percent;[13]

- In both 2008 and 2009, the Chinese government imposed a 15 percent duty on RGB exports;[14] and

- From at least 2002 through 2004, the Chinese government imposed an export fee of ¥230/mt. After 2003, exporters paid the Chinese government a bidding fee per metric ton for the quotas which they were allotted.[15]

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[11] See Alsion Burke, "Battle of the bauxites," *im.*, July 2005, p. 32.

[12] The extent to which the cost increase from the elimination of the rebate would raise price depends on the pass-through rate. Under plausible conditions (e.g., a rising supply curve for RGB), the entire 13% cost increase would not be passed through to customers.

[13] **"**Refractory bauxite – what next?," *Mineral Price Watch*, January 2009, p. 4.

[14] See "New Chinese export duties in 2008," *Mineral Price Watch*, January 2008, p. 1; DSF Refractories & Minerals Ltd News Page at www.dsf.co.uk/news.php?newsID=200700014 . ("January 2008 has produced a further sharp increase in the price of Chinese refractory grade bauxite. This was, in part, a direct consequence of changes in Chinese government policy. Presently and for the foreseeable future the Chinese authorities aim to discourage the export of its natural resources. The specific measures implemented were as follows: ● the reduction in the total export quota for bauxite from China. ● The implementation of new 15% export duty on all bauxite exports from 01/01/08.") See also Richard Copp, v.p. sales and marketing, Resco, letter to Fedmet Resources Corporation, February 29, 2008. Mr. Copp's letter states, "The Chinese government also announced in late 2007 that they will impose a 15% Export Tax on all bauxite shipments from China effective January 1, 2008" and that "[i]nternal demand in China has driven growth rates for metallurgical and refractory grade bauxite to over 35% in 2007 resulting in a shortage of tons to supply under the Chinese export licenses. The increased domestic demand coupled with the government's direction to reduce the production of bauxite to lessen pollution and electricity shortages/allocations in China, makes bauxite a 'very scarce and high-priced raw material' according to mineral suppliers. The upcoming Olympic Games in Beijing in July is expected to exacerbate the issue of availability as the Chinese government has indicated that they will force high-polluting industries such as bauxite . . . which produce air pollution to cease operations during the July games."

[15] See, for example, Mike O'Driscoll, "Bauxite chop & change," *im* February 2005, p. 6. See also China Committee for the Invitation for Bid for Export Commodity Quotas, Announcement on Paid Use of Export Quotas of Bauxite of 2002, December 2001; China Committee for the Invitation for Bid for Export Commodity Quotas, Announcement on Paid Use of Export Quotas of Bauxite of 2003,November 2002;China Committee for the Invitation for Bid for Export Commodity Quotas, Announcement on Paid Use of Export Quotas of Bauxite of 2004, December 2003; China Committee for Invitation for Bid on Export Quota, Announcements on Public Bidding for Export Quotas of Bauxite of 2005; China Committee for Invitation for Bid on Export Quota, Announcements on Public Bidding for Export Quotas of Bauxite of 2006; China Committee for Invitation for Bid on Export Quota, Announcements on Public Bidding for Export Quotas of Bauxite of 2007; China Committee for Invitation for Bid on

Third, significant regulatory requirements of the Chinese governments affected the cost of producing and delivering RGB. Starting no later than 2005 and possibly as early as 2003, provincial Chinese governments began ordering shaft and round kilns to shut down in order to reduce air pollution.[16] I am informed that rotary kilns are more expensive to build and operate than are shaft and round kilns,[17] and produce RGB that is more consistent in terms of quality and is frequently priced above RGB from shaft and round kilns.[18] Further, the unanticipated closing of many old-technology and low-cost kilns that had been producing the bulk of Chinese calcined bauxite could be expected to have caused capacity shortages and associated price increases until rotary kiln capacity replaced the capacity lost due to closures of the shaft and rotary kilns. There is no clear indication of the number of shaft and beehive kilns forced to close or the time period over which closures have occurred, and different sources suggest different time periods. However, there is general agreement among industry observers that the closures affected supply and therefore prices. One source reported that the Chinese government's closure of primary bauxite calcining facilities in 2006 "wiped out a significant portion of supply almost overnight,"[19] and a second source reported that RGB shortages in 2007 were attributable at least

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Export Quota, Announcements on Public Bidding for Export Quotas of Bauxite of 2008; China Committee for Invitation for Bid on Export Quota, Announcement on Public Bidding for Export Quotas of Bauxite of 2009.

[16] See, for example, Minerals Price Watch ("MPW"), "China bauxite crisis deepens," October 2007; Alison Tran, "Quest for calcined bauxite," *im,* March 2007, p. 33, and Alison Burke, "Battle of the Bauxites," *im*, July, 2005. (Tran reports that prior to the implementation of this policy, shaft and rotary kilns were estimated to produce 80 percent or more of Chinese RGB. Thus, "Effectively the whole industry has had to convert to more costly rotary kilns or simply go out of business.") See also Mike Driscoll (editor, *Industrial Minerals*), "Best of both worlds: supply and demand," PowerPoint presentation, Fourth International Symposium on Refractories, March 24-28, 2003 ("● privatization, environmental controls = vastly reduced capacity perhaps by 900,000 tpa, esp. shaft kilns in Shanxi ● more rotary kilns built? poss. price rise?")

[17] See Tran, *op. cit.* and Driscoll, *op. cit.*

[18] See, for example, Alsion Burke, "Battle of the bauxites," *im*, July 2005, p. 33 ("Whilst rotary kilns have the advantage of being able to control critical factors such as combustion and temperature, round kilns, although fairly rudimentary, have long produced calcined bauxite with high bulk densities…and more importantly, at good prices.) See also The *Minerals Yearbook* which indicates that through 2004 the free-along-ship ("f.a.s.") price for Chinese RGB produced by rotary kilns was significantly higher than the prices for product produced by shaft and round kilns, and "Refractory bauxite – what next?" MPW, January 2009 (…bauxite prices have been climbing steadily since the second quarter of 2007, when typically Shanxi round kiln grades were between $130-160 per tonne, and Shanxi rotary grades were in the order of $140-160 per tonne, both FOB Xingang.")

[19]See, for example, Alison Tran, "Quest for calcined bauxite," *im,* March 2007, p. 33.

in part to "the ongoing closures of all bauxite kilns in the provinces of Henan, Shanxi and Shandong."[20]

Trade press sources also report that in mid-2004 the Chinese government began implementing new highway laws and enforcing restrictions on the size of truckloads -- developments that are said to have approximately doubled the cost of trucking raw materials to ports "overnight."[21] In addition, during 2007 China imposed a temporary ban on rail transportation of certain raw materials, including bauxite.[22] In a letter to a customer dated in February 2008, explaining reasons for higher refractory prices in that year, plaintiff Resco Products reported that the Chinese government had also ordered bauxite production curtailed to reduce pollution and electricity shortages. (See note 14, *supra*.)

Apart from action by the Chinese government restricting exports and affecting the supply and price of the bauxite defendants purchased to produce RGB, there were other effects on the market unrelated to any alleged conspiracy that Dr. Lamb's report fails to take into account. One such factor that could be expected to affect the price of RGB is the increased use of RGB by the domestic Chines aluminum and other industries. RGB is used to produce, among other things, refractories for the steel, glass, cement and aluminum industries. But it can also be used in other ways including as a raw material directly in the production of aluminum metal. China's production of aluminum increased rapidly over the relevant time period, from an estimated 2.04 million metric tons ("m.t.") in 2003 to 8.25 m.t. in 2009.[23] According to one trade press report, "Owing largely to China's voracious appetite for bauxite to feed its aluminum metal refineries, the amount of both metallurgical and non-met bauxite nationwide available for export has steadily declined. Although [RGB] is not the preferred material for making Bayer alumina,

[20] Minerals Price Watch ("MPW"), "China bauxite crisis deepens," October 2007. See also plaintiff's Richard Copp, *op cit*. ("Internal demand in china has driven growth rates for metallurgical and refractory grades bauxite to over 35% in 2007 resulting in a shortage of tons to supply under the Chinese export license. The increased internal demand coupled with the government's direction to reduce the production of bauxite to lessen pollution and electricity shortages/allocations in China, makes bauxite a 'very scarce and high-priced raw material' according to mineral suppliers.")

[21] Alison Burke, "Battle of the Bauxites," *im* July, 2005, p. 32. See also Mike Driscoll, *op. cit.* ("● rising coal prices, tight supply and freight → price rise).

[22] *Mineral Price Watch*, October 2007.

[23] See www.world-aluminum.org/statistics/alumina-production.

Chinese metal producers have learnt to use it."[24] In short, some RGB apparently was diverted from non-metallurgical uses to metallurgical uses (*i.e.*, a significant new source of demand for high-aluminum-oxide bauxite was introduced during the relevant time period).

Dr. Lamb suggests that he has accounted for factors other than the alleged conspiracy "which may have affected pricing by using a technique called multiple regression analysis." However, his regression analysis completely ignores all the factors discussed above, each of which can be expected to have a significant effect on price, and he relies on indices which fail to effectively reflect the effect of factors that he does attempt to take account of. Among the factors he ignores is one – "government mandated export controls" – which even the plaintiff concedes must be taken into account.[25] By not including any variables in his analysis to account for the effects of the export fees, taxes, export quotas or regulatory changes, he necessarily fails to separate the effect of those governmental actions from any purported effect of the alleged conspiracy.

In Section III, I discuss the critical deficiencies in Dr. Lamb's damage analysis which render completely unsubstantiated his conclusion "that all class members were injured as a result of the alleged conspiracy, in that they paid higher prices than they would have but for the alleged conspiracy."

In section IV, I first refine Dr. Lamb's analysis to take into account the above governmental and market factors and to correct other obvious errors. With those refinements, his analysis no longer identifies any effects consistent with the existence of an alleged conspiracy. Next, I present a different, more straightforward regression analysis which takes account of some of the factors that affected supply and demand for RGB exports from China and which were unaccounted for in Dr. Lamb's model. This model also fails to identify any economic effects consistent with the existence of a conspiracy.

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[24] Alison Tran, *op. cit.*, p. 33 (emphasis added). See also Alison Burke, *op. cit.*, p. 32 and Jessica Roberts, "China's bauxite blockade," *im* July 2009, pp. 40 and 41. (●"China has implemented some staggering investments for its alumina capacity…since around 2000…"; ● "Such huge amounts of [metallurgical] bauxite production indicate that, as many suspect, China is attempting to become self-sufficient in aluminum: it is certainly no secret that the country has switched to domestic demand priority" and; ● "What is incredible is that with some of the best raw bauxite in the world – [RGB] – the Chinese government's policy has been to use it to make aluminum." (Emphasis added.))

Roberts also reports (p. 44) that in early 2009 there was almost no mining of raw bauxite in the Xiaoya area of Shanxi province, reportedly "due to a number of accidents that have occurred in underground mining over the last years."

[25] Plaintiff's More Definite Statement as to Paragraph 61 of the first Amended Complaint.

Section V discusses other economic evidence which Dr. Lamb ignores (namely, large changes in alleged cartel members' shares of RGB exports) which is inconsistent with plaintiff's claim that defendants participated in a conspiracy to raise the price of RGB exported from China.

Based on the documents and other information provided in this case, as well as my own research, I have come to the following conclusions:

- Dr. Lamb's regression model for estimating the effect of the alleged conspiracy on the price of RGB exported from China takes no account whatever of important factors that affected the supply of those exports, including changes in the Chinese government's export quotas and its tax policies for exports;
- None of the independent variables in Dr. Lamb's regression model adequately reflect changes in factors affecting the cost of supplying RGB, such as prices for raw materials and labor specific to that commodity as well as the cost of inland transportation;
- None of the independent variables in Dr. Lamb's regression model adequately account for shifts in the demand for RGB over the relevant period;
- Dropping one statistically insignificant variable in Dr. Lamb's regression, total factor productivity, reduces the estimated conspiracy effect by one third, and renders it statistically insignificant, thus providing just one example of how Dr. Lamb's "residual" methodology can attribute error in estimating variables to a "conspiracy" effect;
- Including just two appropriate independent variables in Dr. Lamb's regression eliminates any price effect related to the alleged conspiracy;
- A separate, more straightforward regression analysis which uses a small number of independent variables to take account of changes in the demand for RGB as well as the supply of exports from China confirms that the alleged conspiracy did not affect defendants' prices; and
- In addition to the absence of any price effect, wide swings in the "market" shares of the Chinese companies exporting RGB from China during the alleged conspiracy is evidence that an effective cartel did not exist.

III. DR. LAMB'S MODEL IS CRITICALLY FLAWED BECAUSE IT DOES NOT TAKE ACCOUNT OF IMPORTANT FACTORS THAT AFFECTED DEFENDANTS' RGB PRICES (INCLUDING THE CHINESE GOVERNMENT'S QUOTA AND EXPORT TAXES) AND BECAUSE IT CONTAINS METHODOLOGICAL ERRORS

Dr. Lamb correctly explains that an analysis which purports to measure overcharges in a price-fixing case "should control for other relevant factors so that the measured overcharge includes only the effect of the conspiracy on prices…. The need to consider the effect of other factors on price arises because even when suppliers collude to set price, prices may still be

affected by other factors."[26] To control for other factors he uses regression analysis, a statistical technique frequently employed by economists and others to estimate the relationship between a "dependent" variable of interest, in this case the price of RGB exported from China, and a set of "independent" or "explanatory" variables which can be expected to affect the dependent variable.

In this Section, I first explain why the independent variables Dr. Lamb includes in his regression analysis do not take account of the important demand and supply factors mentioned above and then discuss several other critical infirmities in his analysis.

A. Dr. Lamb's Independent Variables Do Not Include Critical Factors that Affected the Supply and Price of RGB Exported from China

Prices in export markets are affected by shifts in both demand and supply. Shifts in demand for a product can be caused by a variety of factors, including population growth, recessions, new sources of demand (*i.e.*, new uses for the product) and either the introduction of new substitute products or changes in the prices of substitutes. Shifts in supply refer to changes in the cost of producing a product, which can be attributable to changes in the cost of raw materials (*e.g.*, bauxite ore with the specific chemical characteristics required, and energy for calcining it), changes in labor cost, changes in transportation cost, and shifts in technology (in this case, for example, increased reliance on rotary kilns). All of these factors can be expected to have affected equally domestic and export prices, and thus can be taken into account by using domestic price as a "control" and measuring the difference between the net export price and the net domestic price. As long as a Chinese exporter of RGB could have sold that RGB instead in the domestic market, then the "opportunity cost" of an export sale is the net price that the exporter could have received in the domestic market. Thus, the marginal cost of an export sale equals the domestic price.

This has two implications. First, as discussed further in Section IV, a critical independent variable that needs to be included in a regression to investigate the effect of an alleged cartel on export price is the domestic price. Second, as that section also discusses, a regression model that examines the export price relative to the domestic price and includes an independent variable to

[26] Lamb Report, pp. 12-13.

take account of export taxes and fees finds no effect of an alleged conspiracy on export prices. Alternatively, one can use a regression with a small number of independent variables which include the price Bosai paid for raw (*i.e.*, unprocessed) RGB, taxes and fees leveled on export sales, and a variable that reasonably reflects demand for RGB. That regression analysis similarly finds no effect of an alleged conspiracy.

1. Dr. Lamb's variables for capturing shifts in demand

Dr. Lamb's damage model uses the output of steel in China and the United States to take account of shifts in the demand for RGB. He explains that refractories are used in the production of steel and that steel production therefore is an important source of demand for RGB. Of course, refractories are also used in the production of other products, including aluminum, glass, and cement, but as long as world production of those other products is highly correlated with world production of steel, it is not unreasonable to use steel production as one independent variable to take account of shifts in the demand for RGB.

Nonetheless, Dr. Lamb's effort to model demand shifts ignores two issues. First, as discussed in Section II, Chinese aluminum producers began using RGB not just as a refractory material but also as a substitute for bauxite ores less rich in aluminum oxide during the period of the alleged conspiracy. That practice represents a new source of demand which could have significantly affected the price of RGB by diverting Chinese supply to an alternative use.

Second, RGB is exported to produce refractories for steel plants throughout the world, not just for plants in China and the U.S. Production of steel in the U.S. accounted for less than 10 percent of worldwide steel production over the relevant period, meaning that Dr. Lamb's demand model effectively ignores a large share of the industrial demand he deems relevant.[27] Thus, worldwide steel production would offer a more appropriate measure of steel-related demand for RGB.

[27] See www.worldsteel.org/statistics/staistics-archive/annual-steel-archive.html. According to Dr. Lamb, the "U.S. consumes roughly half of the western world's total refractory grade bauxite, predominantly in the production of iron and steel." (Lamb Report, p. 15. Emphasis added.) However, over the relevant period the U.S. produced less than 30% of the steel produced in the U.S., Western Europe and South America and less than 15% of worldwide steel production outside of China. *Ibid*.

2. Dr. Lamb's variables for capturing shifts in supply

Dr. Lamb uses five independent variables to take account of changes in the cost of supplying RGB:[28] a purchasing price index for Chinese raw materials, fuel and power; a measure of manufacturing labor costs in China; a total factor productivity index for China; a consumer price index for China; and the exchange rate between the yuan and other currencies, including the U.S. dollar.[29] As explained below, these variables cannot be expected to capture shifts in the supply of RGB that were described and discussed in Section II.

First, the Chinese quota can be expected to decrease the quantity of RGB exported from China and raise the price of exports. By the same token, it can be expected to increase the quantity of RGB supplied to domestic customers and reduce the price they pay. Indeed, the purpose of a quota can be to protect domestic consumers of the product subject to the quota.[30] However, none of Dr. Lamb's variables take account of a reduction in exports attributable to changes in the Chinese government's RGB export quota. These changes include a 2009 quota that was approximately half the 2008 quota and also a very substantial reduction in exports in 2005 attributable to the imposition of the quota system that year.[31]

Second, none of Dr. Lamb's variables reflect changes in the Chinese government's tax treatment of RGB exported from China. Those changes include, among others, a 13 percent increase in cost associated with the Chinese government's decisions to stop rebating the VAT on

[28] Four of the independent variables appear in Dr. Lamb's regression analysis as three separate explanatory variables, each with a different "lag."

[29] An **X** percent increase in the value of the yuan relative to the dollar represents an **X** percent increase in the dollar price of any product purchased in China.

[30] According to one observer (Mike O'Driscoll, "International Trade in Industrial Minerals, *op. cit.* p. 54), "in early 2005 China's economy was growing at 9.5% per annum… But in 2003-2004, China's soaring market growth triggered a major shift in world minerals trade. Although China will remain an important exporter of industrial minerals, its ravenous domestic consuming markets became the priority for China's minerals producers. The incentive to export raw material became less attractive (and was replaced by the incentive to export lower-cost finished products such as refractories and ceramics). In fact, the Chinese government took formal steps to conserve its mineral resources, such as reducing mineral export volumes. This prompted a major shortage of Chinese-sourced minerals worldwide. High domestic market demand, limited energy sources and rising costs, plus a creaking internal freight network, all contributed to a major increase in Chinese mineral prices."

[31] See Mike O'Driscoll, "Bauxite chop & change," *i.m.* (February 2005), p. 7. ("Market observers estimate that at least 1.4m. tonnes of Chinese bauxite is expected to be the final officially exported volume in 2004, and therefore the reduced quota volume of 1m. tonnes in 2005 will result in serious shortages on the market.")

exports in late 2003 and, in addition, to impose a 15 percent duty on RGB exports in 2008 and 2009 as well as an increase in the unrebated VAT in 2009 from 13 percent to 17 percent.

Third, the data Dr. Lamb uses to take account of changes in input prices – a raw material price index, a labor price variable and a consumer price index – cannot be expected to reflect changes in the input costs for RGB for several reasons. Focusing first on raw materials prices, the overall raw material price index for China that he uses is very broad, rather than specific to the raw materials used in the production of RGB. In addition to fuel and power (which are important inputs into the production of RGB), the overall index includes ferrous metals, nonferrous metals, raw chemical materials, timber and paper pulp, building materials, agricultural products and textile materials.[32] The individual indices for many of these raw material categories behave very differently over time, and even if that was not the case there is no reason to assume that any of those individual indices accurately reflect the raw material cost of non-metallurgical bauxite, which in addition to energy (largely from coal), is the principle raw material used to produce RGB.

To capture increases in the labor cost associated with supplying RGB, Dr. Lamb uses an index for Chinese manufacturing labor cost. However, a substantial share of the relevant labor cost is associated with mining non-metallurgical bauxite, and the index for Chinese mining labor cost and for manufacturing labor cost (related to calcining and crushing RGB) move quite differently over the relevant period.[33] The index for mining non-metallurgical bauxite increased 245 percent between 2002 and 2009 while the index for manufacturing labor costs increased only 144 percent. Thus, Dr. Lamb's labor-cost index, limited to manufacturing, underestimates a significant contributor to rising labor costs overall for RGB.

As discussed in Section II, the cost associated with transporting non-metallurgical bauxite ore to kilns as well as transporting calcined and crushed RGB to ports for delivery overseas is widely reported to have increased dramatically in 2004 as a result of new trucking regulations, and increased again in 2007 when railroads were temporarily banned from carrying certain raw materials. Apart from the Chinese consumer price index, Dr. Lamb includes no independent variable that would reflect changes in transportation costs. Because transportation accounts for a

[32] See "Purchasing Price Indices for Industrial Producers" at www.stats.gov.cn/tjsj/ndsj/2010/indexeh.thm.

[33] See "Average Wages of Employed Persons in Urban Units by Sector at www.stats.gov.cn/tjsj/ndsj/2010/indexeh.thm.

much larger share of the delivered price of bulk raw materials, such as RGB, than it does of the delivered price of manufactured goods (*e.g.*, electronic products, cars and clothing),[34] the Chinese CPI will not accurately reflect the increased cost of inland shipping for Chinese RGB.

Finally, over the relevant period some Chinese provincial governments began ordering the closure of round and shaft kilns that produced as much as 80 percent of calcined bauxite at the turn of the century, forcing more and more producers of calcined bauxite to a newer but higher cost technology, rotary kilns. None of Dr. Lamb's independent variables, including his total factor productivity index,[35] can be expected to take account of the increased cost attributable to the government-mandated closure of those old-technology kilns.

The prices that Chinese domestic customers paid for RGB would be affected by all of the supply-side (*i.e.*, cost) factors discussed above except changes in export taxes and quotas. Therefore, as discussed below in Section IV, the prices that Bosai received from its domestic customers over the relevant period can better account for supply-side factors such as raw material, labor, energy and transportation costs than the independent variables that Dr. Lamb uses to account for those factors. Indeed, once the domestic price has been included as an independent variable (or otherwise taken into account), the only other explanatory variables that need to be added are variables that would affect export prices differently from domestic prices (*e.g.*, taxes on exports and the export quota).

B. Dr. Lamb's Regression Analysis Is Also Critically Flawed by Methodological Errors

Dr. Lamb's analysis is also marred and rendered unreliable by a number of methodological flaws discussed in this section.

[34] See, for example, Mike O'Driscoll, "International Trade in Industrial Minerals, *op. cit.* p. 50 ("Freight and logistics costs can be 50% to 70% of delivered cost of mineral to customers…")

[35] "Total Factor Productivity (TFP) is the portion of output not explained by the amount of inputs used in production. As such, its level is determined by how efficiently and intensely the inputs are utilized in production." (See Diego Comin, "Total Factor Productivity" at www.people.hbs.edu/dcomin/def.pdf.) The total factor productivity index Dr. Lamb used shows productivity for the Chinese economy as a whole growing substantially during the very years – 2003 to 2007. However, the closure of low-cost kilns and other events, including mine closures and transportation shortages discussed in Section II, over much of that period may have reduced productivity related to calcining bauxite. As discussed elsewhere, the statistical significance of Dr. Lamb's results depends critically on this variable.

1. Dr. Lamb combines (i.e., "pools") Bosai and CMP data

The dependent variable in Dr. Lamb's regression is the price that both Bosai and CMP charged for RGB exported for deliver to U.S. destinations. Dr. Lamb obtained price data from each of 155 separate shipments for U.S. delivery that defendants supplied over the relevant period. (Each of these shipments is referred to as an "observation.") The RGB exported for delivery to the US. is a raw material that, while relatively homogeneous or undifferentiated in comparison to many manufactured goods that households purchase, can differ in various dimensions including its alumina content, the granularity of the material, the consistency or uniformity of the material in terms of alumina content and granularity, size of shipment, and packaging.[36] Therefore, the fact that the defendants sold at very different prices at the same point in time and at the same location strongly suggests that different purchasers were not always buying the same product; *i.e.*, that important characteristics of the products were quite different.

Dr. Lamb noted that CMP charged its customers substantially higher prices than did Bosai, and suggested that he could address this problem by using a single "indicator variable" to distinguish between Bosai and CMP transactions.[37] By doing so, he implicitly assumed that Bosai's prices and CMP's prices were affected to the same extent by changes in his independent variables and that the Bosai and CMP data could be "pooled" (*i.e.*, used in the same regression). There are standard statistical tests to determine whether, in fact, the companies' prices were similarly affected by the independent variables so that these data sets can safely be pooled, but Dr. Lamb did not apply any of those tests. Applying the most commonly used test (the "Chow test"),[38] I determined that data from the two companies should not be pooled. (Section III.B.3 discusses what happens when the data are not pooled.)

[36] See Mike O'Driscoll, "International Trade in Industrial Minerals, *op. cit.* p. 51 for a list of other factors that also can affect the price different customers pay for an industrial mineral such as RGB.

[37] An indicator variable is a variable that assumes only two values, zero and one. For example, it takes the value zero when a factor (*e.g.*, a conspiracy) is not present and the value one when that factor is assumed to be present.

[38] See Jeffrey Wooldridge, *Introductory Econometrics a Modern Approach*, 4th edition, pp. 243-245 for a discussion of the Chow statistic which tests for whether data from two groups (*e.g.*, Bosai customers and CMP customers) follow the same regression function.

2. Dr. Lamb treats all but one of CMP's shipments as comprised of a single homogeneous product

As noted above, Dr. Lamb observed that CMP's prices were significantly higher than Bosai's prices and used an indicator variable to distinguish between Bosai's contracts and CMP's contracts. However, he did not distinguish among any of CMP's contracts – in effect, he treated all of CMP's contracts as if they involved exactly the same product.[39]

Exhibit 2 shows all the CMP prices that Dr. Lamb used in his analysis. Each dot in the exhibit represents an average contract price per ton of RGB for a CMP shipment.[40] Note that the prices for a small number of CMP contracts are double or even triple the price for other CMP contracts in the same month. Price differences of that magnitude are a warning sign that the relatively few high-priced contracts likely are "outliers"; *i.e.*, they involve RGB products with a very different set of characteristics from the great majority of the RGB products sold by CMP.[41]

Dr. Lamb appears to recognize that the data he used may contain outliers because he does exclude one CMP contract (*i.e.*, one observation) from his regression, even though he does not mention doing this in his report. There are statistical techniques for identifying whether one or more observations are far out of line with other observations and may appropriately be excluded from a regression analysis. Using a standard statistical procedure known as studentized residuals, I identified a total of twelve outliers in the CMP data.

3. *Dr. Lamb assumes the alleged conspiracy had the same effect each year*

A third methodological flaw in Dr. Lamb's analysis is his use of a single indicator variable to measure the effect of the alleged conspiracy.[42] This approach is based on the implicit assumption that the conspiracy raised price by the same percentage each and every year.

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[39] He did this despite the fact that a perusal of the CMP data indicates the some individual CMP shipments are comprised of two or more products with substantially different prices. See 2003 – 2009 USA CMP Sales – GSBLAW – 14May09.xls.

[40] The price per ton is read off the vertical or y axis and the month in which the shipment was delivered is read off the horizontal or x axis.

[41] While outliers are sometimes attributable to data-entry errors, they "can also arise when sampling from a small population if one or several members of the population are very different in some relevant aspect from the rest of the population." See Wooldridge, *op. cit.,* p. 375.

[42] See note 37 *supra*.

However, the results from numerous economic studies of cartels show that the ability of a cartel to raise price can be expected to wax and wane over time.[43]

There are at least five telltale signs that the limitations in the analysis Dr. Lamb uses (including the omission of any variable to account for the important demand and supply factors discussed above) and his methodological errors have produced deeply flawed and completely unreliable regression results. First, regression analysis gives an analyst a tool (namely, a separate conspiracy indicator variable for each year) to test whether an alleged conspiracy has the same effect over time. When the effect of the alleged conspiracy in this case is allowed to vary across years and no other changes are made in Dr. Lamb's regression analysis, the estimated effects differ dramatically and implausibly from one year to the next. See Exhibit 3. From 2004 through 2008 the estimated effect of the conspiracy is positive and ranges from 0.27 percent in 2007 to 47.3 percent in 2004. In 2003 and 2009 the estimated effects are -11.3 percent and –60.8 percent, respectively.[44] Although none of these results are statistically significant, the results in 2003 and 2009 could suggest, contrary to reason, that the alleged conspiracy reduced the price of exports in these years.

A second telltale sign of critical flaws in Dr. Lamb's analysis is the fact that the estimated effects of certain independent variables in Dr. Lamb's regression make no economic sense. For example, cost increases are expected to lead to price increases. However, according to his regression analysis, a one percent increase in manufacturing labor costs over a one-year period produces an approximately 12 percent decline in the price of RGB one month after the year-

[43] For example, research indicates that the extent to which a cartel endures and/or succeeds in raising price can be expected to change with both the number of alleged conspirators – which, in this case declined dramatically between 2003 and 2009 – and macroeconomic conditions. See, for example, Carlton and Perloff, *op. cit.* pp. 144- 146 and Margaret C. Levenstein and Valerie Y. Suslow, "What Determines Cartel Success," University of Massachusetts Working Paper at http://scholarworks.umass.edu/econ_working paper/90, p. 10 ("In general, instability in economic environment destabilizes cartels.")

It is also worth noting that Dr. Lamb has only a single observation for 2009. This means that he is estimating the alleged effect of the conspiracy through 2009 using only a single actual price data point for that year even though the data from previous years show a great deal of variation in price from contract to contract. That variation means in turn that his damage estimate could be quite different if he had more observations in 2009. This observation is especially important in light of the fact that the only 2009 price in Dr. Lamb's sample is a CMP contract for which the price was $655.22/m.t. The U.S. Geological Survey reports, however, that the average price per ton for RGB imported from China in 2009 was $516/m.t. This strongly suggests that if Dr. Lamb had more data his estimate of the alleged overcharge through 2009 would have been lower.

[44] None of the individual-year conspiracy effects is statistically significant. The absence of statistical significance means that the data cannot reject the "null hypothesis" that the alleged conspiracy had no effect on price.

over-year increase.[45] Then, after a two-month lag, a one percent increase in manufacturing labor cost over a one-year period raises the price of RGB by about 9 percent.

These estimates are especially striking when one recognizes that manufacturing labor cost accounts for a relatively small percentage of the cost of producing RGB and, therefore, a one percent increase in manufacturing labor cost, if fully passed through, would not be expected to decrease the price of RGB, or to increase it by 9 percent. Similarly, according to Dr. Lamb's regression analysis, a one percent increase in the consumer price index ("CPI") for China over a one year period is associated with a 6.2 percent increase in the price of RGB after a one month lag, and another 4.4 percent increase after a two month lag. Dr. Lamb offers no explanation (and I can find none) for why a small change in the CPI would, contrary to reason, cause such a large change in the price of RGB. Neither effect is statistically significant, but as discussed elsewhere, keeping independent variables in a regression despite clearly inaccurate coefficients can impact the coefficient on a "residual" variable such as Dr. Lamb's conspiracy variable.

Third, Dr. Lamb should have performed his regression analysis without pooling the Bosai and CMP data, in which case his analysis would have been based on Bosai data alone. Dr. Lamb had the data needed to perform a separate analysis for CMP as well, but did not.[46] When Dr. Lamb's regression model is run using only the Bosai data and only his flawed independent variables, the alleged conspiracy is estimated to have increased Bosai's prices by an astounding 122.3 percent, or almost five times the magnitude of the estimated overcharge he obtains when he pools the two defendants' data. A damage model which estimates that an alleged price-fixing conspiracy increased one conspirator's price by five times the amount it increased a second conspirator's price is clearly unreliable if, for no other reason, it would leave one of those conspirators charging far more than the other.

Fourth, when a single statistically insignificant explanatory variable – total factor productivity – is dropped from Dr. Lamb's regression, the estimated conspiracy effect drops by one third and is no longer statistically significant. In short, his results are extremely sensitive to

[45] The estimated effects of many individual independent variables in Dr. Lamb's regression are statistically insignificant, and this fact buttresses the criticism that the variables do not adequately measure changes in the cost of supplying RGB.

[46] Dr. Lamb presumably did not recognize that CMP produced contract data from 2002, and therefore he could not estimate a separate alleged conspiracy effect for each defendant using his before-during damage model.

the inclusion of a variable that does not even have a statistically significant effect on the price of RGB.

Finally, as discussed below in Section IV, introducing into Dr. Lamb's analysis explanatory variables that better account for changes in supply and demand (*e.g.*, for factors which shift the supply curve for RGB, including the government-mandated closure of round and shaft kilns, transportation cost changes and changes in export taxes) completely eliminates the alleged conspiracy's estimated effect on the price of RGB; *i.e.*, the effect either disappears or is no longer statistically significant.

IV. A CORRECTED DAMAGE MODEL ESTIMATES NO PRICE EFFECT FROM THE ALLEGED CONSPIRACY

In the previous section, I discussed a host of flaws in the regression analysis that Dr. Lamb used to estimate damages. Certain of those flaws (*e.g.*, failing to distinguish between f.o.b. and c.i.f. prices) will introduce error, but *a priori* I have no expectation as to the direction of the error. However, other flaws (*e.g.*, the omission of independent variables to take account of either the Chinese government's export quota or changes in the Chinese government's tax policies) clearly bias his estimate upward and cause him to find a price effect from the alleged conspiracy when there is none.[47] This bias results in part from the fact that Dr. Lamb uses an indicator variable to measure the effect of the alleged conspiracy, an approach which has the effect of attributing to that conspiracy the effects of changes in variables that should have been included but were instead omitted. Therefore, he attributes to the purported conspiracy any post-2002 increase in Bosai's and CMP's prices that either should have been attributed to independent variables that are missing from his regression (*e.g.*, the quota and increases in export taxes as well as capacity shortages created by the closure of round and shaft kilns) or results from errors in the estimated coefficients on the variables he does include (*e.g.*, manufacturing labor cost).

In this section, I describe two different approaches to analyze whether there is in fact empirical evidence that the alleged conspiracy had an effect on the prices that Bosai and CMP

[47] The export quota was in effect in five of the seven years during which Dr. Lamb assumes a conspiracy was in effect. As a result, when an indicator variable for the quota is added to the regression, the regression cannot distinguish between the effect of the alleged conspiracy and the effect of the (known and certain) quota.

charged U.S. customers for Chinese RGB. The first approach starts with Dr. Lamb's regression analysis and makes two changes. It:

1. Removes all twelve outliers from the CMP data so that the dependent variable in the regression is the price for a more homogenous RGB product, and

2. Adds two additional independent variables to Dr. Lamb's regression – the price that Bosai charged its domestic Chinese customers each year (which represents the "opportunity cost" of an export sale[48]) and a variable that takes account of the (combined) tax rate that the Chinese government imposed on exports each year.[49]

As discussed below in Section IV.A (and shown in Exhibit 5), these two steps alone eliminate any estimated effect of an alleged conspiracy on the prices the defendants' U.S. customers paid for RGB imported from China, even without taking account of the Chinese government's export quota. In short, had Dr. Lamb simply removed all of the outliers in the CMP data[50] and included in his regression (which has 24 independent variables) two additional explanatory variables – one that accurately reflects changes in factors that affect the price of all Chinese RGB (*e.g.*, raw material, labor and energy costs as well as new sources of demand) and one that takes account of export taxes – his regression analysis would not attribute any effect on export prices to the alleged conspiracy.

A second approach to analyzing whether there is empirical evidence that an alleged conspiracy raised the price of Chinese RGB exports, discussed below in Section IV.B (and shown in Exhibits 6 and 7) involves using two much simplified regressions. The first regression uses the domestic price as a control or benchmark and two other independent variables, including an indicator variable for the alleged conspiracy. The second uses only four independent variables in addition to the conspiracy indicator variable. Neither much-simplified regression finds an effect on export prices from the alleged conspiracy.

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[48] See Section IV.A for an explanation of "opportunity cost" and its usefulness in reflecting changes in the cost of supplying RGB.

[49] China imposed a value-added tax ("VAT") on exports and in 2008 and 2009 an export duty. Each of those taxes was in the form of a percentage of the sale price. Those two taxes can be combined and represented by a single independent variable. China also required companies that exported RGB to purchase export licenses. The export license fees were set as an amount per metric ton exported (rather than percentages of the sale price). Therefore, the license fee, which applied only to exports, can be taken into account by adding it to the price that Bosai earned on sales to its domestic customers.

[50] Dr. Lamb removed from the data used in his regression only one of the 12 outliers that I identified by employing a standard statistical procedure, studentized residuals, for identifying outliers.

A. After Correcting the Data Used by Dr. Lamb and Including in His Regression Two Variables that Accurately Account for Changes in Factors which Affect the Export Price of RGB, the Alleged Conspiracy Has No Estimated Effect

As explained in Section III, the prices Bosai charged its domestic customers reflect all the costs of supplying RGB to the domestic market. It also reflects all the cost of supplying RGB to the export market except for taxes that are imposed only on exports. Thus, the domestic price for RGB effectively represents the "opportunity" cost of making sales in the export market; that is, it equals the minimum export price that a firm must earn in order to continue allocating some RGB to the export market rather than selling it exclusively in the domestic market. A firm that earns $X per unit selling its product in the domestic market will prefer to make domestic sales rather than export sales if export prices are less than $X per unit plus export taxes. If the domestic price for RGB increased and the export price did not soon follow, defendants would shift sales from the export market to the domestic market, causing export prices to increase. Thus, when higher demand and higher input costs caused the domestic price for RGB to increase between 2002 and 2008, I would expect the export price to follow roughly dollar for dollar. Exhibit 4 shows that this is precisely what happened over the period 2002 - 2004 and 2006 - 2007 (Bosai had no U.S. export sales in 2005); Bosai's domestic price approximately equaled its export price throughout these periods, even though export sales were taxed somewhat more heavily than domestic sales.[51]

I have started with Dr. Lamb's regression analysis and modified it in two respects. First, I have removed the outliers in CMP's data. Second, I have added two independent variables: (1) the opportunity cost of export sales which is represented by Bosai's domestic price and (2) a variable that takes account of changes in the VAT and export duties applied to exports.[52] Exhibit 5 shows that these two modifications completely eliminate the estimated effect of the alleged

[51] In fact, Bosai's domestic prices were sometimes higher than its export prices. This is likely attributable to the fact that the domestic price includes inland transportation to domestic customers, and some of Bosai's domestic customers were located much further from Bosai's processing facility than the port from which Bosai shipped RGB to its U.S. customers.

[52] See note 49 *supra*.

conspiracy; the coefficient on that indicator variable becomes -0.008 and is statistically insignificant.[53]

B. A Much Simplified Regression Analysis Confirms that the Alleged Conspiracy Did Not Increase the Defendants' Export Prices

In view of the inherent weaknesses in the explanatory variables that Dr. Lamb uses in his regression analysis, I have also used two far simpler regression specifications to test plaintiff's contention that the alleged conspiracy raised export prices above the level it would have been but-for the alleged conspiracy. The dependent variable in Dr. Lamb's analysis is the logarithm ("log") of the export price, and his regression relates changes in that price to changes in his independent variables. The dependent variable (*i.e.*, the variable whose values are explained by the independent variables) in my first regression is the log of the ratio of the net export price (*i.e.*, the export price minus export taxes and fees) to the net domestic price (*i.e.*, the opportunity cost of an export sale). The dependent variable is constructed this way because, as explained above, a X percent increase in the opportunity cost of RGB (*e.g.*, due to increased demand for RGB or to higher production costs) should also increase the net export price by roughly X percent, leaving the dependent variable unchanged. Any conspiracy effect should take the form of an increase in the net export price relative to the net domestic price, and thus an increase in the dependent variable. In short, when the dependent variable is constructed this way, a statistically significant positive coefficient on the conspiracy indicator variable would indicate that the alleged conspiracy raised the price defendants charged for exports for delivery to the U.S. relative to the domestic price.

The only two independent variables whose coefficients are estimated by this regression are an indicator variable for the conspiracy and a second indicator variable for 2008 observations. The 2008 variable is there to reflect especially unusual market conditions that year. As noted earlier, the trade press and the plaintiff itself reported that a sharp increase in

[53] Exhibit 5 reports the results when the CMP data and Bosai data are pooled, even though I explained in Section III.B.1 that a statistical test indicates data from the two defendants should not be pooled. I have reported the pooled results in order to minimize the number of modifications to Dr. Lamb's analysis that are needed to remove any estimated effect on price from the alleged conspiracy.

RGB prices in 2008 were "in part, a direct consequence of changes in Chinese government policy" including a "reduction in the total export quota for bauxite from China."[54]

Consistent with a statistical test which indicates that the Bosai and CMP data should not be pooled, I have run this simplified regression using only the Bosai data. The results from that regression are reported in Exhibit 6. The coefficient on the conspiracy indicator variable is 0.079 and is statistically insignificant. Statistical insignificance means that one cannot conclude that the coefficient is in fact different from zero or, in this case, that the alleged conspiracy had any effect on price. The coefficient on the 2008 indicator variable is 0.57 and highly statistically significant at conventional levels. This indicates that net export prices in 2008 were higher relative to domestic prices than in other years, including all other years of the alleged conspiracy, as can also be clearly seen in Exhibit 4. Inclusion of the 2008 indicator variable enables the regression to distinguish the effect of unusual market conditions related to Chinese government policy toward exports that year from any effect of the alleged conspiracy.

For the sake of completeness, I have also run a second simplified regression without using the domestic price as a control. The dependent variable in this regression, like that in Dr. Lamb's regression, is the log of the (gross) export price. This regression has four independent variables in addition to the conspiracy indicator variable: (1) the input cost, including the export fee, of the raw calcined refractory bauxite Bosai purchased from domestic suppliers and processed in accordance with specifications for exports; (2) the 2008 indicator variable; (3) the export tax rate; and (4) a demand variable, total world steel production. See Exhibit 7. The "conspiracy period" variable and the 2008 indicator variables are both statistically indistinguishable from zero in this regression, while the cost and demand variable each has the expected positive sign and a coefficient value consistent with what economic theory would predict. Both the cost and demand variables are also statistically highly significant. Thus, while the domestic price may be the theoretically preferred independent variable to control for changes in demand and cost conditions, there is no support for any finding of a conspiracy effect even if instead one simply uses an industry-specific cost variable, along with a demand variable, to control for factors other than the alleged conspiracy.

[54] See note 14, *supra*

V. OTHER ECONOMIC EVIDENCE IS INCONSISTENT WITH PLAINTIFF'S CLAIM THAT DEFENDANTS PARTICIPATED IN A CONSPIRACY THAT RAISED THE PRICE OF RGB EXPORTED FROM CHINA

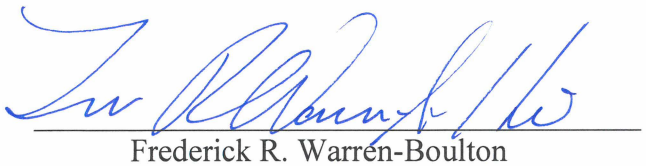
Economic evidence cannot conclusively disprove that defendants colluded in an attempt to restrict output and raise price. However, the evidence discussed in this report that there was no effect on price attributable to any alleged conspiracy strongly suggests the absence of a conspiracy, and in any event, the absence of any economic damage to Plaintiff. In addition, the allegation in this case that defendants joined a cartel in 2003 and remained in it until at least 2009 is utterly implausible in the face of evidence that defendants' shares of exports fell substantially during the period of the alleged conspiracy.

Economics teaches that a putative cartel member is unlikely to continue to participate in a conspiracy when participation would result in a substantial loss of share to other cartel members.[55] In this case, plaintiff alleges a cartel that raised price by an estimated 25 percent over a period of at least seven years, despite evidence that the shares of defendants and their alleged co-conspirators changed dramatically over that period. For example, Table 4 of the Lamb Report shows the US import value of Chinese refractory grade bauxite imported into the U.S. from 2003 through 2009 and Table 5 of the Lamb Report shows both Bosai's and CMP's estimated sales of Chinese refractory grade bauxite imported into the U.S. over the same period.[56] Based on the data in those tables, Exhibit 8 to this report shows that each defendant's share of Chinese RGB exports to the U.S. was extremely unstable. Bosai's share ranges from a high of 74.5 percent in 2003 to a low of zero percent in 2005 and 2009 while CMP's share

[55] See generally, Dennis Carlton and Jeffrey Perloff, *Modern Industrial Organization*, 4th ed., chapter 5, "Cartels." The authors note (p. 139) that "Unless a cartel can detect violations of its price-fixing agreement and prevent reoccurrences, member firms engage in secret price cutting (or output expansions) that destroy the cartel." Thus, two important cartel enforcement methods are "divide the market" and "fix market shares." (Emphasis added.) They also note (p. 132) that "Attempts have been made to cartelize the market for many of the major internationally traded commodities. Most of these initiatives have failed, however, as the cartels fell apart quickly or were unable to raise prices substantially."

[56] Many of Bosai's U.S. sales of RGB for delivery in the U.S. are reported in terms of delivered prices, not prices f.o.b. a Chinese port (i.e., Bosai's revenue figures include the cost of ocean transportation between China and the U.S.) However, the U.S. import values in Table 4 of the Lamb Report are based on RGB prices f.o.b. Chinese ports and therefore exclude the cost of ocean transportation. Thus, share calculations based on these two tables leads to an over-estimate of Bosai's share of U.S. imports of Chinese RGB each year.

ranges from a high of 19.4 percent in 2003 to a low of 2.2 percent in 2009.[57] No firm will remain in a cartel if its share falls to zero.



Frederick R. Warren-Boulton

November 13, 2014

[57] Nor does the fact that Bosai's share of U.S. exports may have been affected by its acquisition of a majority interest in RGB production assets in Guyana in March 2007 lend any credence to the notion that a conspiracy existed. While Bosai's share of U.S. RGB imports from China declined substantially after 2008, its share of U.S. imports supplied by Chinese companies did not decline because Bosai began exporting relatively large quantities of RGB from Guyana. Thus, Exhibit 9 shows that Bosai's share of U.S. imports from Chinese companies increased from 21.3% in 2008 to 63.6% in 2009. That is a share gain that Bosai's alleged Chinese co-conspirators would be unlikely to tolerate. Also, the 2009 U.S. Geological Survey Yearbook reports that Guyanese RGB export prices were lower in 2008 and markedly lower in 2009 than Chinese export prices. The fact that Bosai sold RGB it exported from Guyana for prices deeply undercutting those of Chinese RGB exports during this period also tends to negate any inference that Bosai participated in a price-fixing conspiracy.

Exhibit E

IN THE UNITED STATES DISTRICT COURT

FOR THE WESTERN DISTRICT OF PENNSYLVANIA

- - -

RESCO PRODUCTS, INC.,	:	
Plaintiff	:	
VS.	:	Civil Action No.:
BOSAI MINERALS GROUP CO., LTD.,	:	2:06-CV-235-JFC
and	:	
CMP TIANJIN CO., LTD.,	:	
Defendants	:	Page 1-201

- - -

Tuesday, February 24, 2015

- - -

Videotaped Deposition of DR. FREDERICK R. WARREN-BOULTON, taken at Boies, Schiller & Flexner, LLP, 5301 Wisconsin Avenue, NW, Washington, DC 20015 commencing at 9:17 a.m. before Sherry L. Brooks, CLR, Professional Court Reporter and Notary Public, in and for the District of Columbia.

- - -

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ALSO PRESENT:
Daniel Holmstock, Videographer

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EXHIBITS

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Exhibit 4 Chinese Bauxite Export Quotas 152

PROCEEDINGS

THE VIDEOGRAPHER: We are now on the record. This begins Videotape Number 1 in the deposition of Dr. Warren-Boulton taken in the matter of Resco Products, Inc. versus Bosai Minerals Group Company Limited, et al, defendants, pending before the United States District Court for the Western District of Pennsylvania, Case Number 2:06-CV-235.

Today is February 24th, 2015, and the time on the video screen is 9:17 a.m.

This deposition is being held at the Law Offices of Boies, Schiller at 5301 Wisconsin Avenue, Washington, DC, at the request of Boies, Schiller.

The videographer is Daniel Holmstock of Magna Legal Services and the court reporter is Sherry Brooks of Magna Legal Services.

For the record now, will counsel present please identify themselves and whom they represent?

MR. ISAACSON: William Isaacson, Boies, Schiller & Flexner for the plaintiff.

MR. GRIFFIN: Sean Griffin of Garvey Schubert Barer for the defendants.

THE VIDEOGRAPHER: Will the court reporter please administer the oath?

WHEREUPON,

DR. FREDERICK R. WARREN-BOULTON,

after having been first duly sworn, was examined and testified as follows:

(Exhibit Numbers 1 through 3 were marked for identification and were attached to the deposition.)

EXAMINATION BY COUNSEL FOR PLAINTIFF

BY MR. ISAACSON:

Q. Doctor, I'd like to understand your assignment in this matter. You've got in front of you your two reports should you need to refer to them at any time, and eventually I'll ask you some specific questions about them.

What did you understand your initial assignment to be in -- when you were preparing your first report?

A. My initial assignment was to respond to

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the report of Dr. Lamb.
Q. For purposes of responding to Dr. Lamb, did you assume, one way or another, whether the conspiracy alleged by plaintiffs in this case was true?
A. No.
Q. Did you assume it was not true?
A. No.
Q. Did you reach a conclusion that the conspiracy alleged by plaintiffs was not true?
A. I reached a conclusion that Dr. Lamb's analysis does not support -- provide empirical support for the existence of a conspiracy or of its effects.
MR. ISAACSON: I'm not getting anything here other than good morning on my realtime.
THE WITNESS: I've got a better one.
THE VIDEOGRAPHER: The time is 9:19 a.m. We're going off the record.
(A break was taken.)
THE VIDEOGRAPHER: The time is 9:28 a.m. We're back on the record.

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BY MR. ISAACSON:
Q. Doctor, did you understand your task in this case to include investigating whether or not there was a conspiracy as alleged by plaintiffs?
A. My task was to examine whether there was empirical evidence that would be consistent or not consistent with the effects of such a conspiracy.
Q. And when you use the term "empirical evidence" in this context, what do you mean?
A. I mean the data that's been provided to both of us, both myself and Dr. Lamb.
Q. And when you say the data, are you referring to sales and cost information, price -- as well as price information?
A. Sale and cost and other information, but also there's a number of documents on the record that provide general information and background on events that were occurring throughout this period.
Q. When you say background documents, do you include discovery that's happened in this case?
A. I believe so.
Q. Alright. So -- so when you say -- so you

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understood your task was to examine whether there was empirical evidence that was consistent or not consistent with the existence of a conspiracy as alleged by plaintiffs; is that correct?
A. Consistent or not consistent with the effects of a conspiracy -- if the conspiracy had no effects, that's all that I can tell from the data.
Q. So part of your task was to examine whether there was empirical evidence that was consistent or not consistent with whether -- well, when you say the effects -- let me withdraw that.
You say consistent or not consistent with the effects of a conspiracy.
What do you mean by the "effects of a conspiracy"?
A. If a conspiracy existed and raised prices, that would be an effect of the conspiracy.
Q. When you say "if a conspiracy existed and raised prices, that would be the effect of a conspiracy" -- when you examine whether there was effect of a conspiracy -- let me break that into two parts.

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Did you look at whether if a conspiracy -- did you examine whether there was empirical evidence that was consistent or inconsistent with whether a conspiracy existed separate and apart from whether that conspiracy raised prices?
A. The only empirical evidence that I have is with respect to its effects -- estimating its effects on prices.
So if a conspiracy existed and had no effect on prices, I would not find an effect.
Q. My question is: Did you do any investigation about whether a conspiracy existed in this case based on empirical evidence?
A. I believe so, yes, in the sense that I look for whether there is an effect of a conspiracy. So my question is: If there was a conspiracy, did it have an effect?
I cannot distinguish between no conspiracy and a conspiracy that had no effect.
Q. And I think we should say for the record because you're on camera that what you have in front of you is a realtime screen. So when you're looking

Q. And the results of that --
A. -- I don't know if you want to characterize this as "certain adjustments."
It's a separate regression. He, in fact, doesn't use these variables at all. It's a -- totally different, both in terms of independent variables and in terms of structure.
Q. Alright. And the result of that regression was that the conspiracy variable was statistically insignificant; is that right?
A. That's correct.
Q. And you concluded because the results were statistically insignificant that you could not conclude that the conspiracy coefficient was, in fact, different from zero or that the alleged conspiracy had any effect on price?
A. Well, not just from that, since there's the issue of how do you interpret his dummy variable for 2003 to 2008, clearly the dummy variable for 2002, if you do find a coefficient there, how you interpret it.
The way you, in fact, could interpret that

as evidence for conspiracy -- and the answer is, even if you did find a significant coefficient, that would not be necessarily evidence of a conspiracy for reasons I went through at some length in the report.
Q. But in this -- based on the -- what you wrote was that "statistical insignificance means that one cannot conclude that the coefficient is, in fact, different from zero."
And that was a correct statement, correct?
A. Yes. In this regression, if you -- in this particular regression, the Rho value is what, 0.23. So it's significant -- or the P value is 0.23.
Q. Alright. And I think it's your opinion that for an economic expert to assert that empirical evidence supports a finding of a causal connection --
THE REPORTER: Excuse me. Please repeat your question.
MR. ISAACSON: I'll say it louder. Let me start over.
BY MR. ISAACSON:
Q. It's your opinion that for an economic expert to assert that empirical evidence supports a

finding of a causal connection between an alleged conspiracy and price, it's widely accepted among professional economists the expert must show a statistically significant relationship between price and the variable that represents the conspiracy?
A. I think you're reading from the report, in which case, yes.
Q. Alright. Now, did you understand Dr. Lamb's report to be a report on damages or a report on liability or both?
A. Well, it was stated to be a report on damages. At some point, it appeared that Dr. Lamb -- or it was my understanding that he was going to argue that this report related to liability.
It's now my understanding based on, I gather, his deposition, that he is saying that this is not relating to liability, it just relates to damages.
Q. Alright. And is it fair to say that a properly conducted regression analysis from the point of view of an economist can be performed to quantify damages in antitrust cases?

A. Of course.
Q. And you have used -- you have used what you would consider properly conducted regression analyses to estimate damages in antitrust cases; is that correct?
A. Yes.
Q. Have you used any -- have you ever used regression analyses to establish whether a conspiracy existed?
A. You cannot use a regression analysis to establish whether a conspiracy existed. You can use a regression analysis to ask the question: Is the evidence consistent with an effect from a conspiracy.
Q. Alright.
A. And if there's an effect from a conspiracy, you can infer then there was a conspiracy.
Q. In terms of sales and price data, what years did the defendants produce that data for?
A. It depends on the defendant and it depends on the data we're talking about. The period is 2002 through 2009. That's the data that was provided,

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regression, is it appropriate to do that based on a properly-specified regression as opposed to a perfectly-specified regression?
A. We try to come as close to perfection as we can.
Q. As does everyone.
A. I'm not sure about that.
Q. Well, I'll give more credit to people.
But in terms of reaching the conclusion as an economist, is it appropriate to reach conclusions about the effectiveness of a conspiracy based on a properly-specified regression model as opposed to a perfectly-specified model?
A. I think properly -- properly-specified and, hopefully, as close to perfect as we can get.
Q. Alright. And in the hypothetical situation where you're using a properly-specified regression to testify -- where year one of a five-year conspiracy is being used as a benchmark to determine the relative effect of year one to years two through five, will that model tend to underestimate the effect of a conspiracy?

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A. If you -- if you -- if you do it -- if, in fact, you start with the assumption that that -- the conspiracy was less effective and you know this to be true in year one, then what you're measuring is the difference in year one than two through five.
There's no way that the methodology can figure out the average effect over across the entire period in a before-and-after model.
So the answer to the question is, yes, since all you're doing now is picking up the difference between the effectiveness of the conspiracy in year one and the effectiveness of a conspiracy in year two through five.
However, obviously, that is not what Dr. Lamb assumed.
Q. Alright. Now, you looked -- you've mentioned the quotas for calcined bauxite imposed by China. You looked at --
A. RGB.
Q. Hum?
A. RGB.
Q. The refractory grade bauxite, yes.

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A. Yes.
Q. The -- and you looked at that as part of -- I believe it's Exhibit 1 to your report.
A. Yes.
Q. So Exhibit 1 of your report reflects that the bauxite export quotas with the specific tariff code there was imposed by the Chinese government; is that correct?
A. Yes.
Q. Alright. In 2009, there is a much lower quota of, I guess, about 400,000 and -- I'm not sure I have the exact number. It's a number over 400,000.
Do you know the approximate number there?
A. I used to know. Let's see, it would be about -- about half because it's only the first half of the year.
It would be about half of -- about 350 it should be -- no. It's more than that. About four -- it looks like it's about 425 -- no, wait a minute.
Q. Is it my -- am I correct that what you did there was you took a quote of 930,000 and cut it in half to 450?

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A. No. There was -- there's a quota for the first half, and then the quota for the second half was suspended.
So this is the actual quota for 2009, which is the quota for the first half of 2009.
Q. What was the total quota for the year, part of which was suspended?
A. That's it.
Q. Before the suspension, what was the total quota for the year?
A. I'd have to go back and look, but I think it was -- it gradually declined, I think, from $1 million down to 970. So I would say it was probably about 960 just from recollection.
Q. Alright. And -- so what -- what you did here in creating this bar chart was eliminate the quota for the second half of the year?
A. There was no quota for the second half of the year.
Q. The previous -- there was a quota for the second half of the year. And then it was suspended?
A. Right.

Q. So you eliminated that quota for the second half of the year; is that correct?
A. Yes. There was no quota allocation for the second half of the year.
Q. Now, in terms of the regression analysis that was done, what was the last transaction for refractory grade bauxite in defendant's data?
A. In our joint data, I think the first six months of 2009.
Q. Was the last transaction, in fact, in March 2009?
A. It would be in the first six months of 2009.
Q. Alright. And did the regression analysis that Dr. Lamb conducted, or any of the regressions that you conducted, include any transactions during the second half of 2009 where the quota was suspended?
A. No. Neither his analysis, nor mine. Neither of us have looked at the effect of the suspension of the quota.
Q. Alright. Did you look at -- did you do

any analysis of the semiannual export quotas of refractory grade bauxite for the first half of the years of 2005 through 2009?
A. Other than the first half of 2009, I haven't looked or considered the effects of the quotas split between the first half and the second half of any year, if that's your question.
Q. Yes. That is my question. Are you aware of any such analysis that was undertaken in this case by Dr. Lamb or anyone else? Again, referring to --
A. Not that I'm aware of, no.
Q. -- what was in the first half of the years of 2005 to 2009?
(Simultaneously speaking.)
A. No. I've never seen it suggested that there was a first half -- separate first half, second half effect of the quota.
MR. GRIFFIN: Just let him finish his question before you give your answer. It might be easier for our court reporter and for everybody else.
THE WITNESS: Okay. I see simultaneously speaking here. Sorry.

BY MR. ISAACSON:
Q. Now, as part of the regression work that you did, you inserted an export quotaed dummy variable; is that right?
A. At one point, yes.
Q. Okay. And you inserted that in place of the conspiracy variable; is that correct?
A. You can do it that way. You can -- yes. You really have to do it that way, yes.
Q. Alright. Did you -- did you or your staff conduct any regressions where you inserted both the export -- export quota and the conspiracy variable as dummy variables?
A. Can I simply state what that would mean? That would mean you would have three dummy variables, one for '02, one for '03, '04, and one for '05 to '09.
I'm not sure how you would want to interpret those. From the question, it sounds like you think '03, '04 is a conspiracy variable.
Q. My question is much simpler than that. Alright. You've said that you -- that you inserted a

dummy variable for export quotas in place of the conspiracy variable.
I want to know whether you conducted any regressions where you used both the export quotas and the conspiracy as dummy variables?
A. I may have. I can certainly tell you what the result would be since it's visually obvious from Exhibit 3.
Q. Alright. The -- now, in Exhibit 3, do you have a conspiracy -- does Exhibit 3 reflect a regression where you have a dummy variable for export quotas and a dummy variable for a conspiracy?
A. Exhibit 3 is a dummy variable for each year relative to 2002. And so if you insert a dummy variable for a group of years, you'll get -- you should get, basically, the average over that group of years. So --
Q. That's not my question. Okay. In Exhibit 3 -- do the regressions in Exhibit 3 have a dummy variable for a conspiracy?
A. In Dr. Lamb's regression, they are all dummy variables for conspiracy. They are just --

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these are all conspiracy dummy variables. They're just by year instead of on average.
Q. Alright. So in exhibit -- do regressions in Exhibit 3 have a dummy variable for a conspiracy in each year?
A. Yes.
Q. Okay. Do your -- does your regression in Exhibit 3 have a dummy variable for export quotas in each year?
A. In my interpretation, not Dr. Lamb's, the effects here could be either a conspiracy or a quota.
Q. That's not my question.
A. So the answer is, in my interpretation, yes; in Dr. Lamb's interpretation, no.
Q. I'm asking about what variables you have here, not how you're interpreting the data. I know how you're interpreting the data and the results.
What I want to know is: In the regressions performed in Exhibit 3, did you use any dummy variable for export quotas, in addition to a variable in each year for the conspiracy?
A. These are yearly dummy variables. Whether

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they are dummy variables that reflect a conspiracy or reflect a quota, it depends on -- on -- on your interpretation.
They could be either.
Q. I'm not asking about interpretation.
MR. GRIFFIN: Let him finish his answer and then he'll answer the question.
A. I'm not quite sure how to say this. I put in a dummy variable. The conspiracy dummy variable is just a year dummy. That's all it is. It's a year dummy. Here are the year dummies.
If you wish to interpret them as a conspiracy, which is what Dr. Lamb wishes to interpret this as, that's how he interprets it.
If you say it's not just a conspiracy, it could be quotas or it could be God knows what, then that's how you interpret it. But these are the dummy variables that in Dr. Lamb's regression he interprets as a conspiracy effect.
BY MR. ISAACSON:
Q. In the regressions in Exhibit 3, did you have separate dummy variables for a conspiracy and

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for export quotas?
A. Separate for conspiracy and quota, no.
Q. Thank you.
A. That's what I've been trying to say.
Q. The -- in any of your regressions that you performed, did you have separate dummy variables for a conspiracy and export quotas?
A. The closest I would come to that would be by looking at 2003 and 2004 and calling that a conspiracy variable and 2005 through 2009 and calling that a quota variable.
Q. You're referring to Exhibit 3 again?
A. Yes.
Q. Okay. In exhibit -- do you have -- in Exhibit 3, there is no year in which you have separate variables -- dummy variables for a conspiracy -- for a conspiracy and export quotas; isn't that correct?
A. The dummy variables are the variables for either the conspiracy or the quota.
Q. I didn't ask you about either. I asked you about separate.

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In any year of the regression analysis reflected in Exhibit 3, did you have separate dummy variables for export quotas and a conspiracy?
MR. GRIFFIN: Objection.
A. No. They are always a combined effect --
BY MR. ISAACSON:
Q. Alright.
A. -- which is what I've been trying to say.
Q. The -- in any of your regression analysis, in any year, did you -- did you look at separately dummy variables for a conspiracy and export quotas as opposed to, as you say, a combined effect?
A. I did, I believe, run a regression in which I used a dummy for 2002 through 2009 -- I'm sorry -- 2003 through 2009, which is what Dr. Lamb refers to as a conspiracy effect and I believe a second variable for just the years 2005 through 2009.
If you wish to interpret those results, my recollection is is that I cannot -- I cannot -- the data does not allow you to distinguish.
There's no significant effect between 2000 and, I guess, '03 and '04 versus '05 through '09, but

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in a price effect probably from 2005 through 2007, approximately, the best I can see.

Q. Alright. Did you do any quantitative analysis as to whether there was any reduction in capacity due to the kiln -- kiln and -- the shaft and round kiln shutdowns?

A. Well, the reports in the Trade Press reported that originally. Let's see if I can do this from memory.

Approximately, 60 percent of the capacity was, I think, shaft and 30 percent round or the other way around, so only about 10 percent was rotary at the beginning.

The shutdown was on the shaft and the round, which implies that over time they had to get rid of 90 percent of the capacity.

There's another report in the Trade Press that talks about 60 percent of the capacity being shut down, a round and shaft.

And there's another report in the Trade Press -- the capacity shutdown was 900,000 tons. They were all very, very large.

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So I'm just reporting to you what the Trade Press says was the extent of the capacity restrictions during those years.

Q. Did you attempt to introduce any variables to reflect the shaft --

THE REPORTER: Please repeat your question.

A. No. Those would be --

MR. GRIFFIN: No. Wait. Repeat the question for the court reporter. Then you can answer.

BY MR. ISAACSON:

Q. Did you attempt to introduce any variable in any regression to reflect the shaft and round kiln shutdowns? Sorry.

A. There's already a variable that would reflect that, and that is what Dr. Lamb is referring to as his conspiracy variable. The conspiracy variable is the shock to the systems over this time period.

So he can't separate it out, but the effect of the capacity shortage empirically would be

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in his conspiracy variable.

Q. Did you attempt in any regression analysis to introduce a separate variable from the conspiracy variable for the shutdown of any kilns?

A. Well, if you don't believe a conspiracy existed, then this dummy variable probably is the effect of the shutdown. If you -- but there's no way to separate those two out.

Q. I want to ask the question again.

A. And the answer is no, because there's no way to separate the two out.

Q. Alright. Let me ask the question.

MR. GRIFFIN: Answer the question after he asks the question.

(Simultaneously speaking.)

BY MR. ISAACSON:

Q. Did you attempt in any regression analysis to introduce a separate variable from the conspiracy variable for the shutdown of any kilns?

A. It is the conspiracy variable.

Q. When you do a regression and you put in a variable for a conspiracy, you can add in

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mathematically a separate variable for a shutdown of kilns, correct?

A. You could, but it's --

Q. Did do you that?

A. No.

Q. And you say if you don't believe a conspiracy existed, then this dummy variable probably is the effect of the shutdown.

Is it the case that you don't believe a conspiracy existed here?

A. I'm saying you can't tell from -- from what he's calling a conspiracy variable.

A conspiracy variable in his regression is all the things he didn't take account of.

Q. That's not my question. My question is about you and your beliefs, not him.

And you said if you don't believe there's a conspiracy here, then the conspiracy variable is likely accounted for by the shutdown.

Do you believe that there was a conspiracy here?

A. I have no views on that. I was not asked

CERTIFICATE

I do hereby certify that I am a Notary Public in good standing, that the aforesaid testimony was taken before me, pursuant to notice, at the time and place indicated; that said deponent was by me duly sworn to tell the truth, the whole truth, and nothing but the truth; that the testimony of said deponent was correctly recorded in machine shorthand by me and thereafter transcribed under my supervision with computer-aided transcription; that the deposition is a true and correct record of the testimony given by the witness; and that I am neither of counsel nor kin to any party in said action, nor interested in the outcome thereof.

WITNESS my hand and official seal this _____ day of _____, 2015.

_____
Notary Public

INSTRUCTIONS TO WITNESS

Please read your deposition over carefully and make any necessary corrections. You should state the reason in the appropriate space on the errata sheet for any corrections that are made.

After doing so, please sign the errata sheet and date it.

You are signing same subject to the changes you have noted on the errata sheet, which will be attached to your deposition.

It is imperative that you return the original errata sheet to the deposing attorney within thirty (30) days of receipt of the deposition transcript by you. If you fail to do so, the deposition transcript may be deemed to be accurate and may be used in court.

ERRATA

PAGE	LINE	CHANGE

SIGNATURE _____ DATE _____

ACKNOWLEDGMENT OF DEPONENT

I, _____, do hereby certify that I have read the foregoing pages ___ to ___ and that the same is a correct transcription of the answers given by me to the questions therein propounded, except for the corrections or changes in form or substance, if any, noted in the attached Errata Sheet.

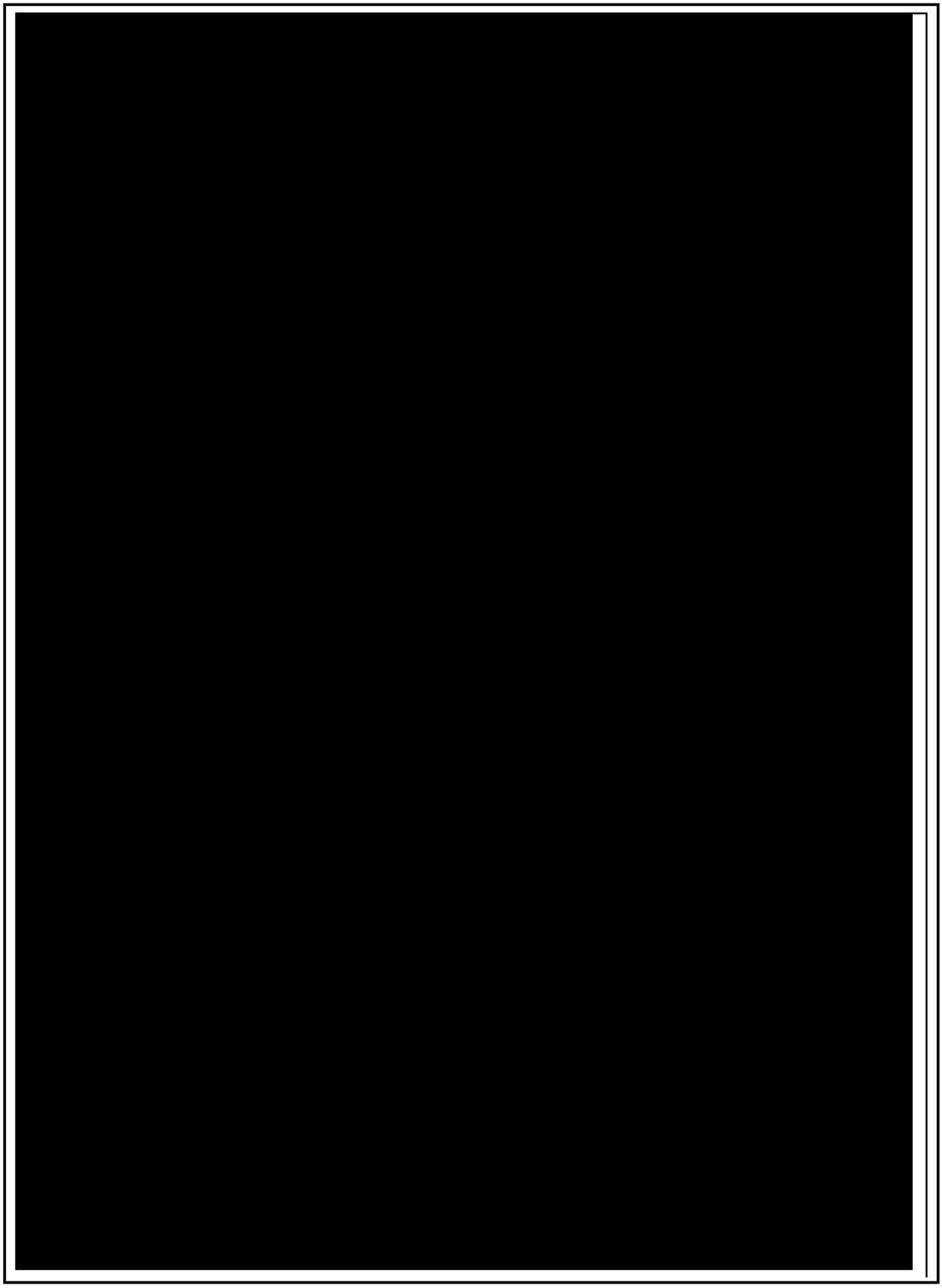
_____ _____
DATE SIGNATURE

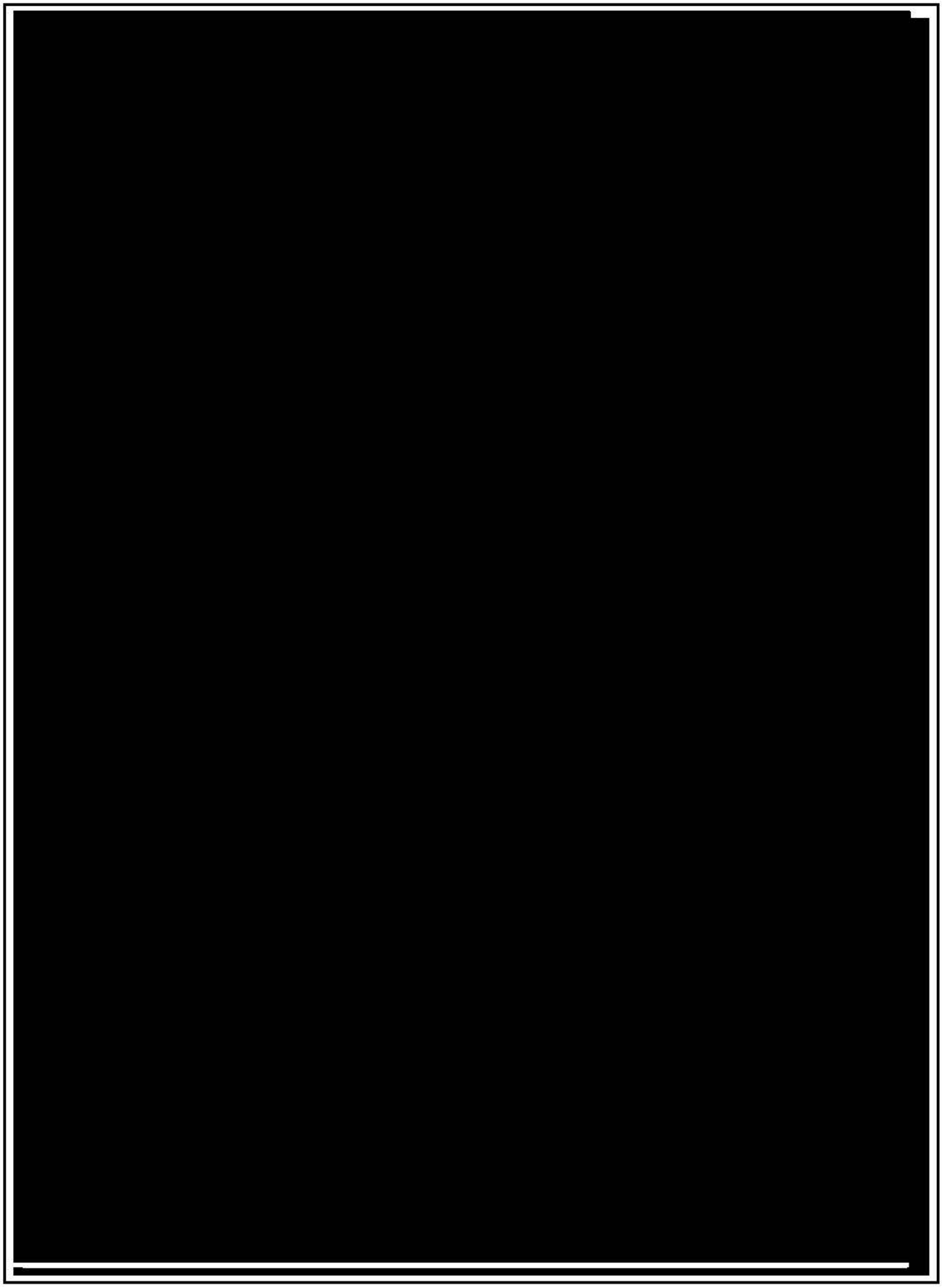
Subscribed and sworn to before me this _____ day of _____, 2015.

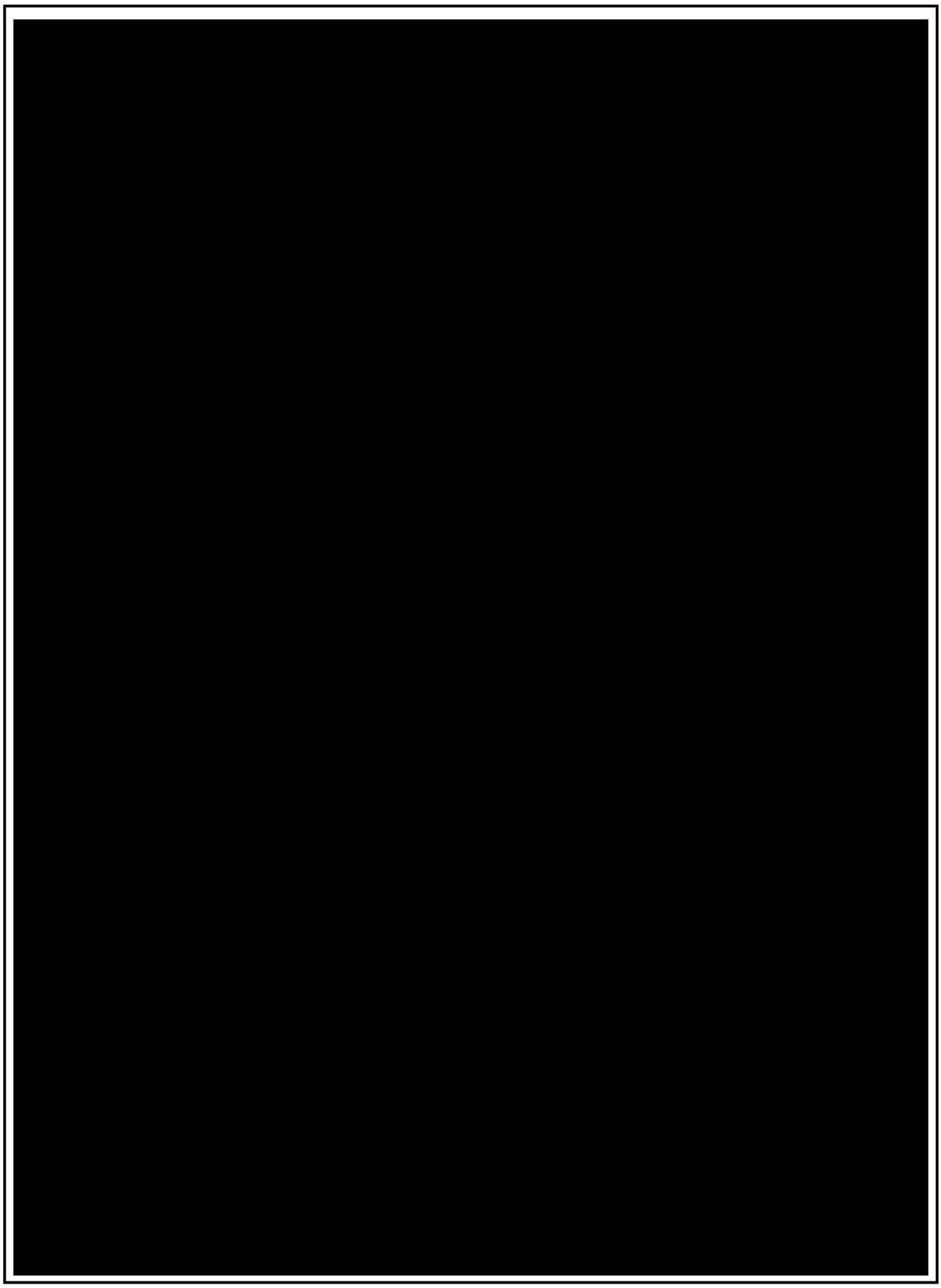
My commission expires:

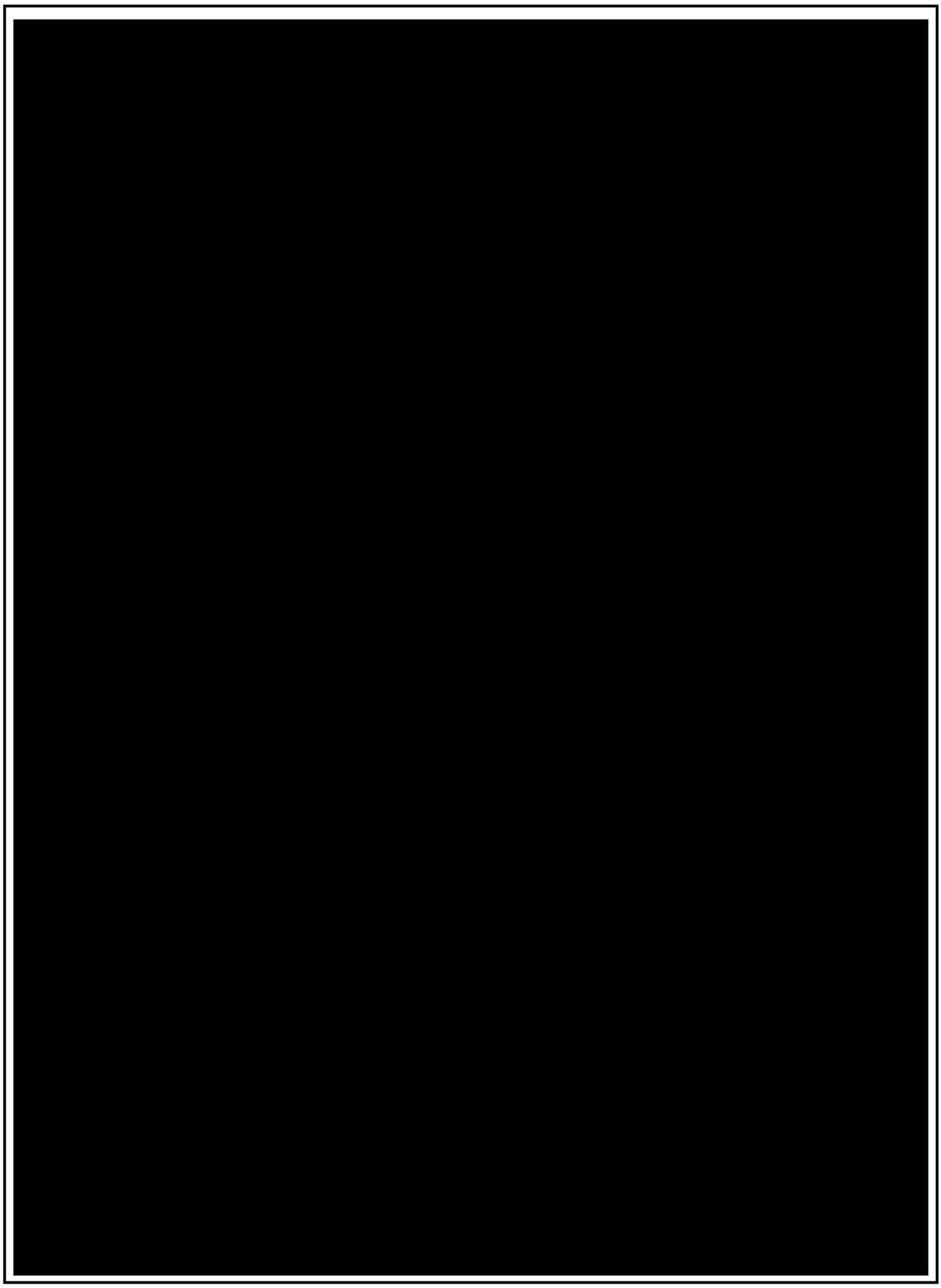
_____
Notary Public

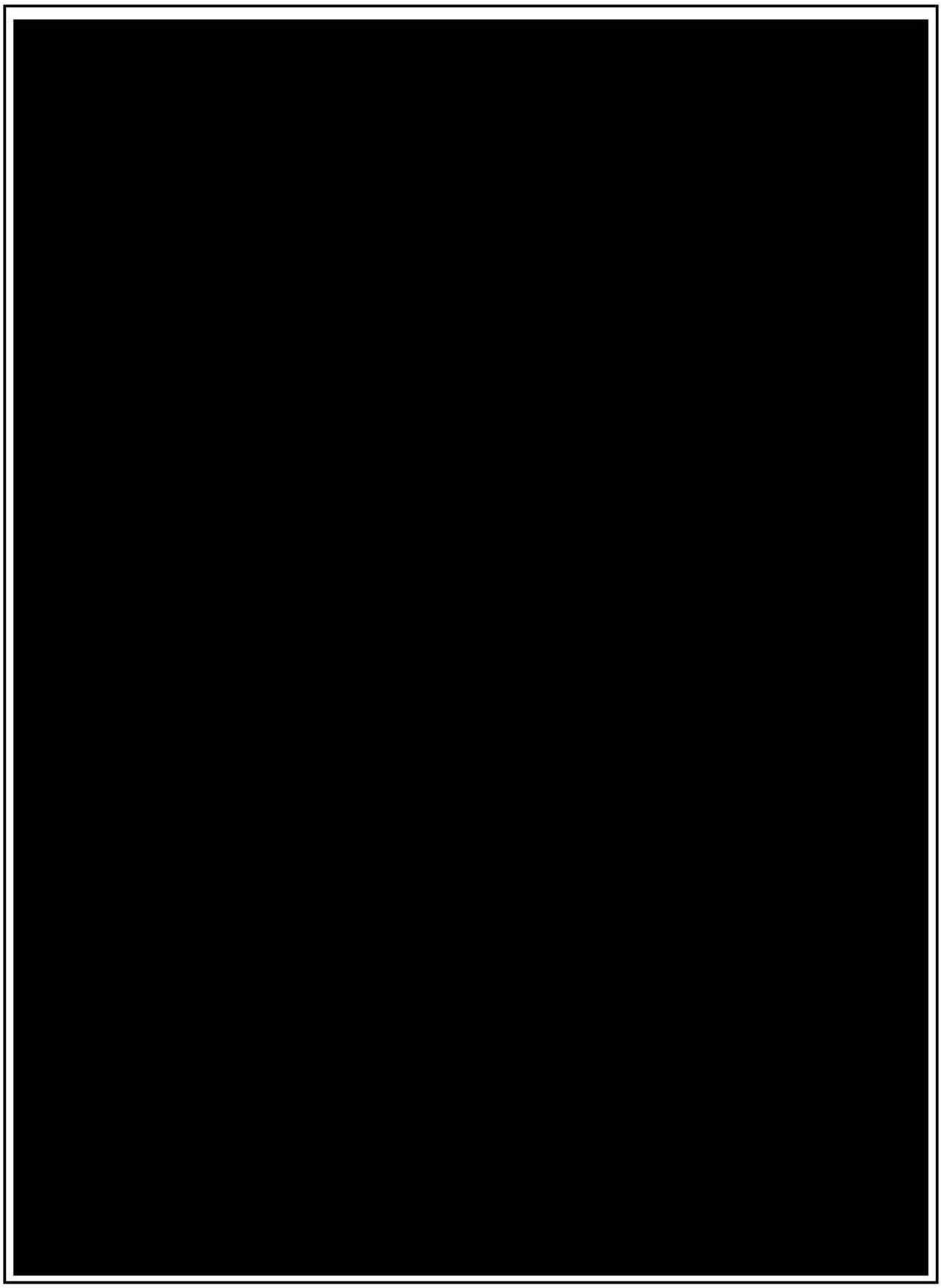
Exhibit F

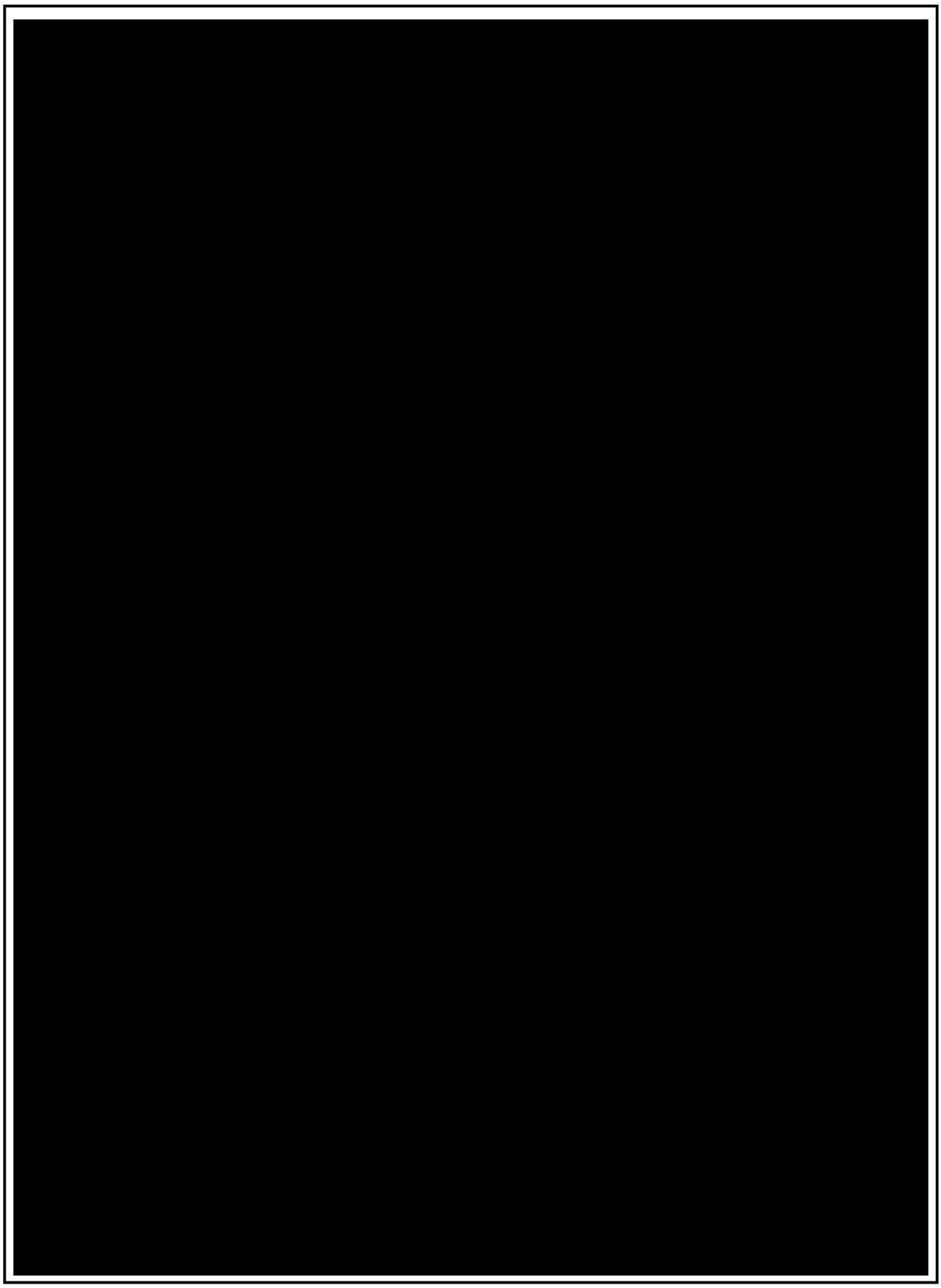


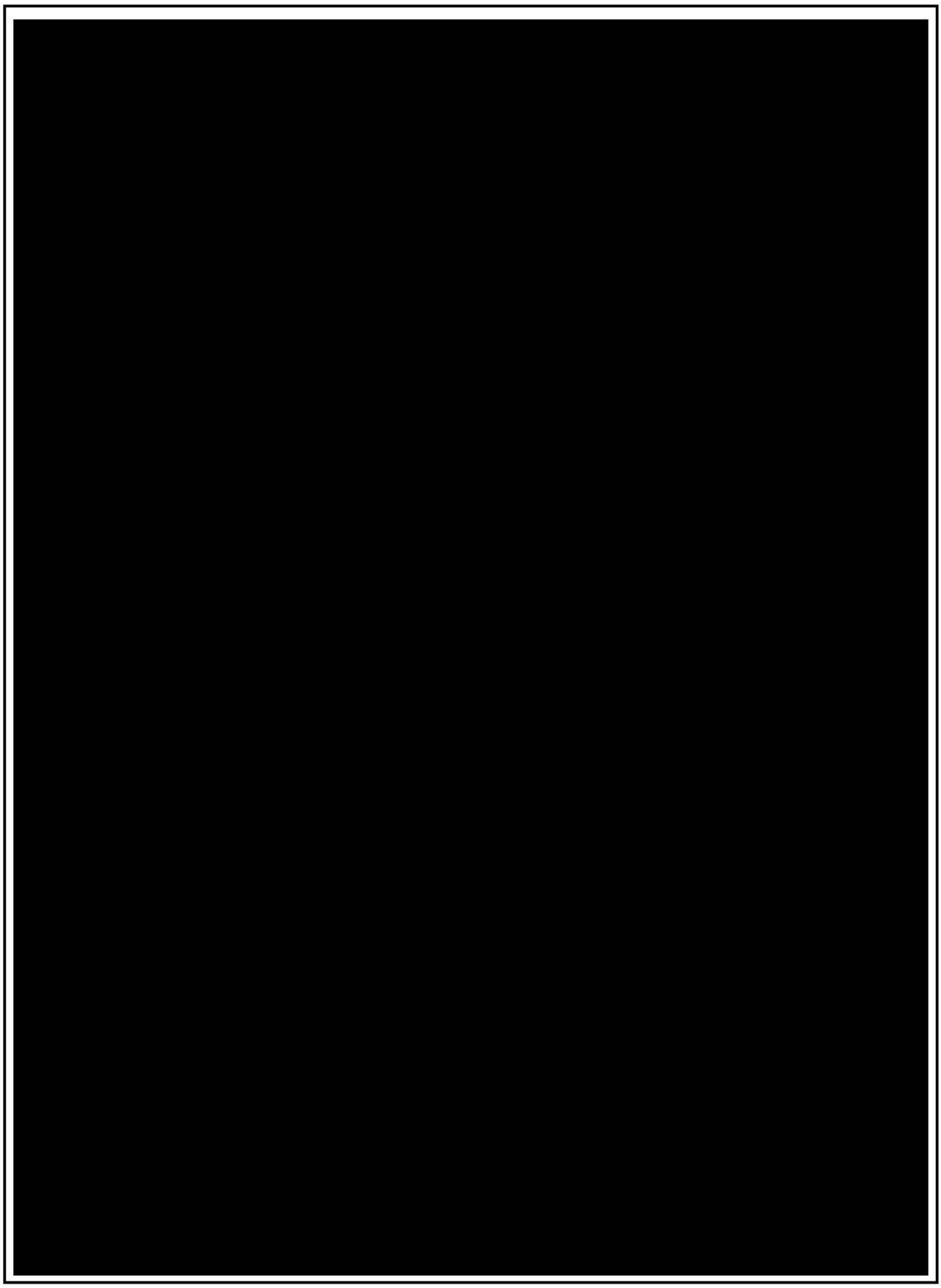


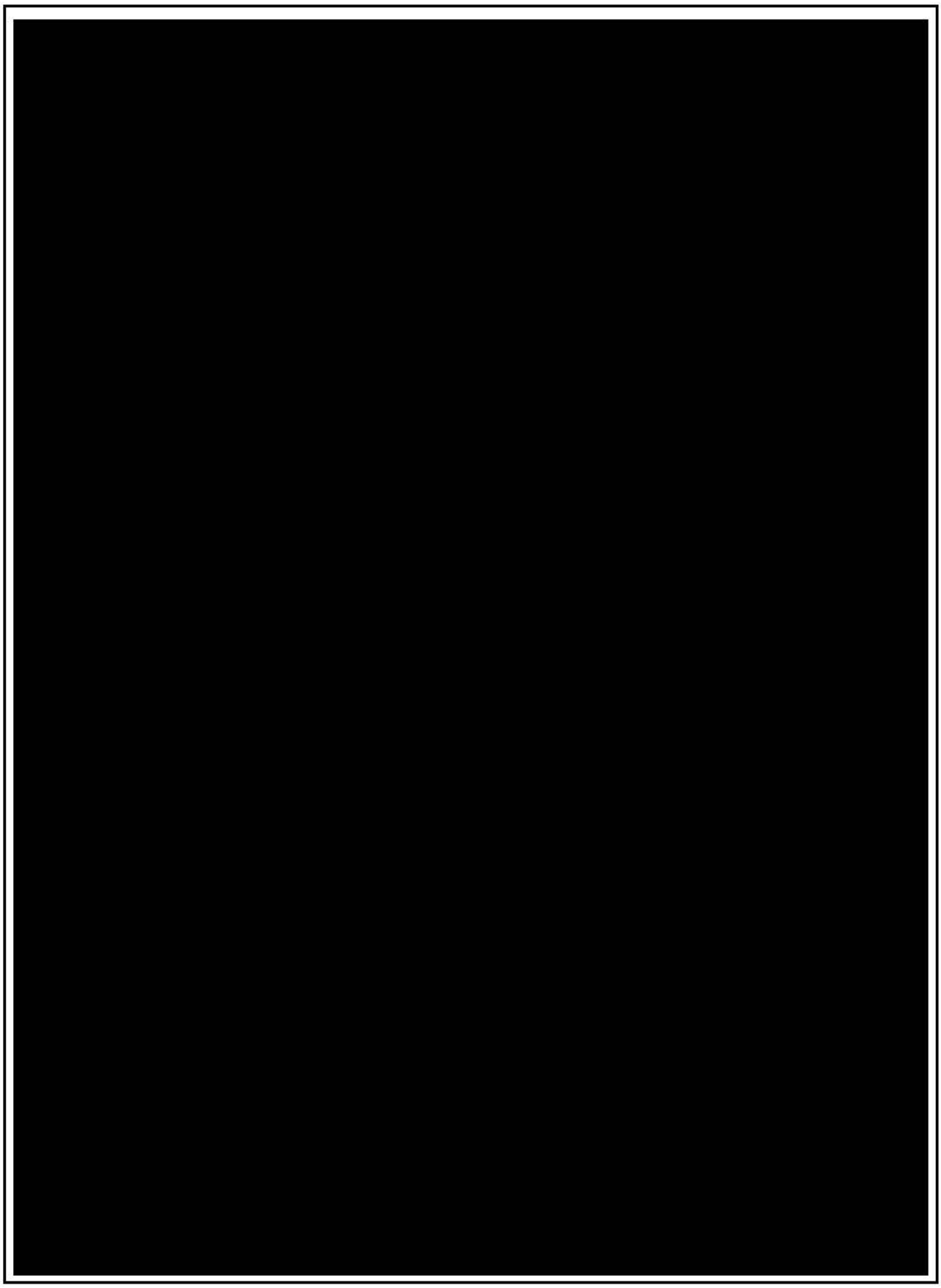


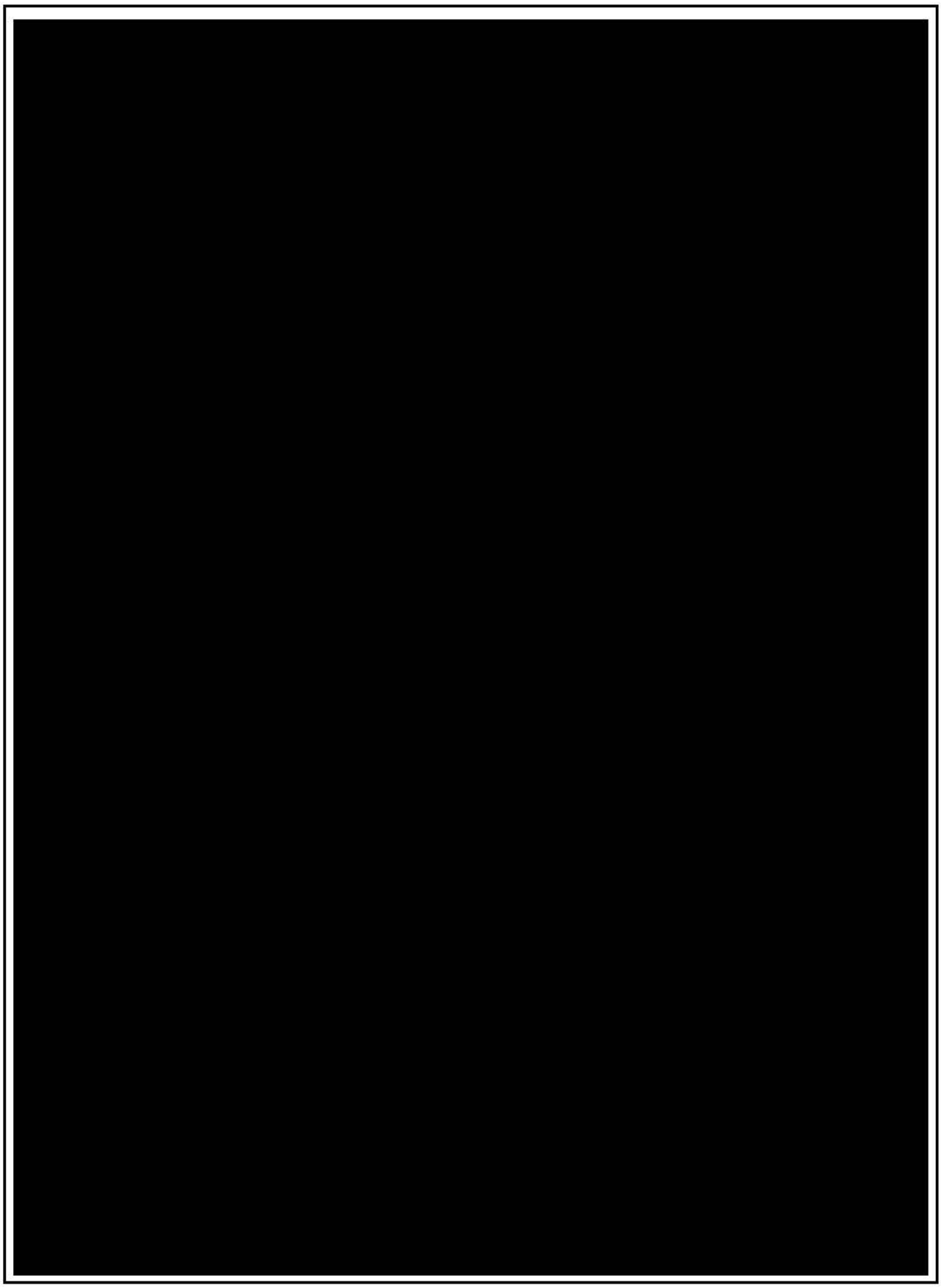


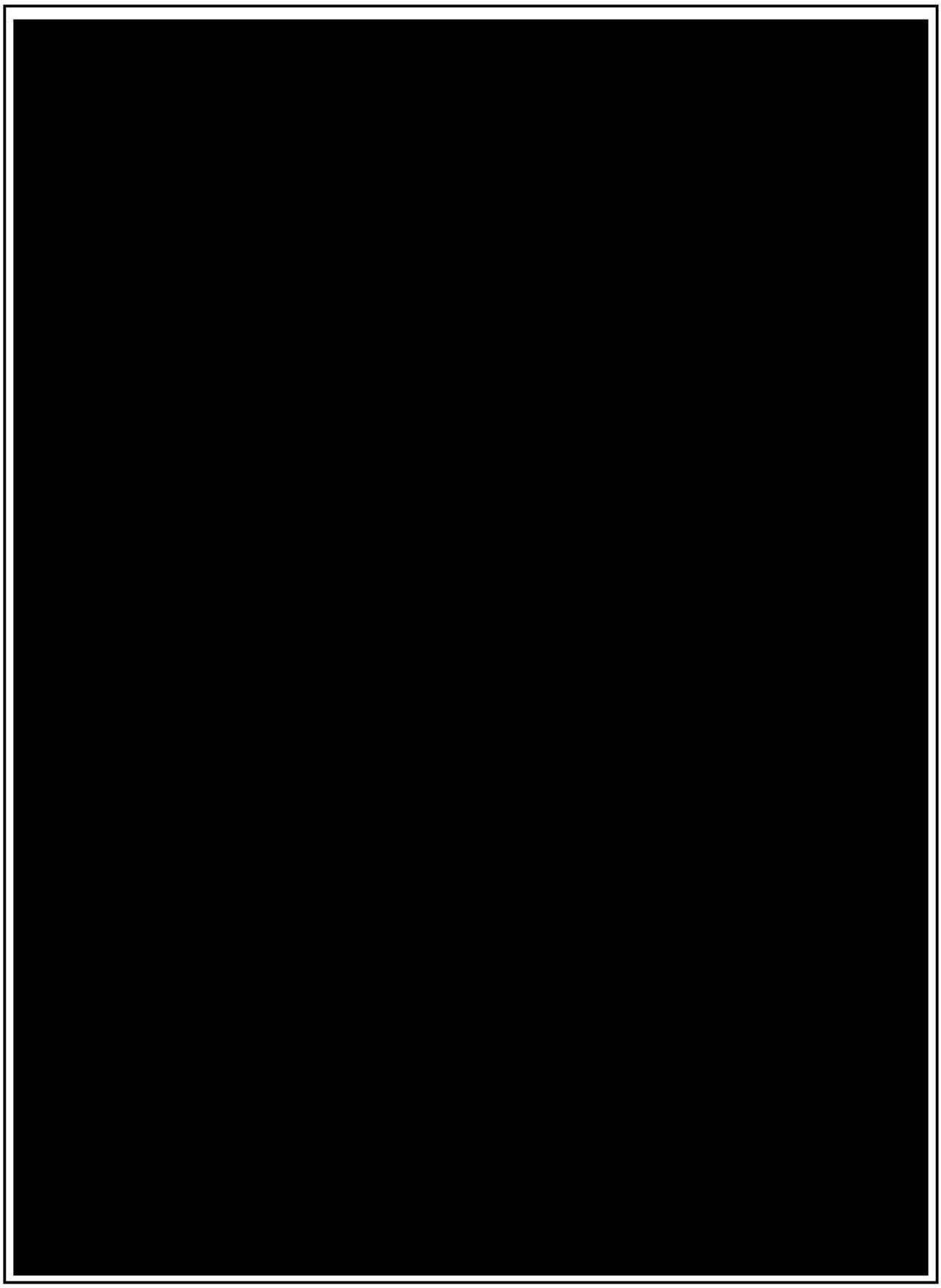


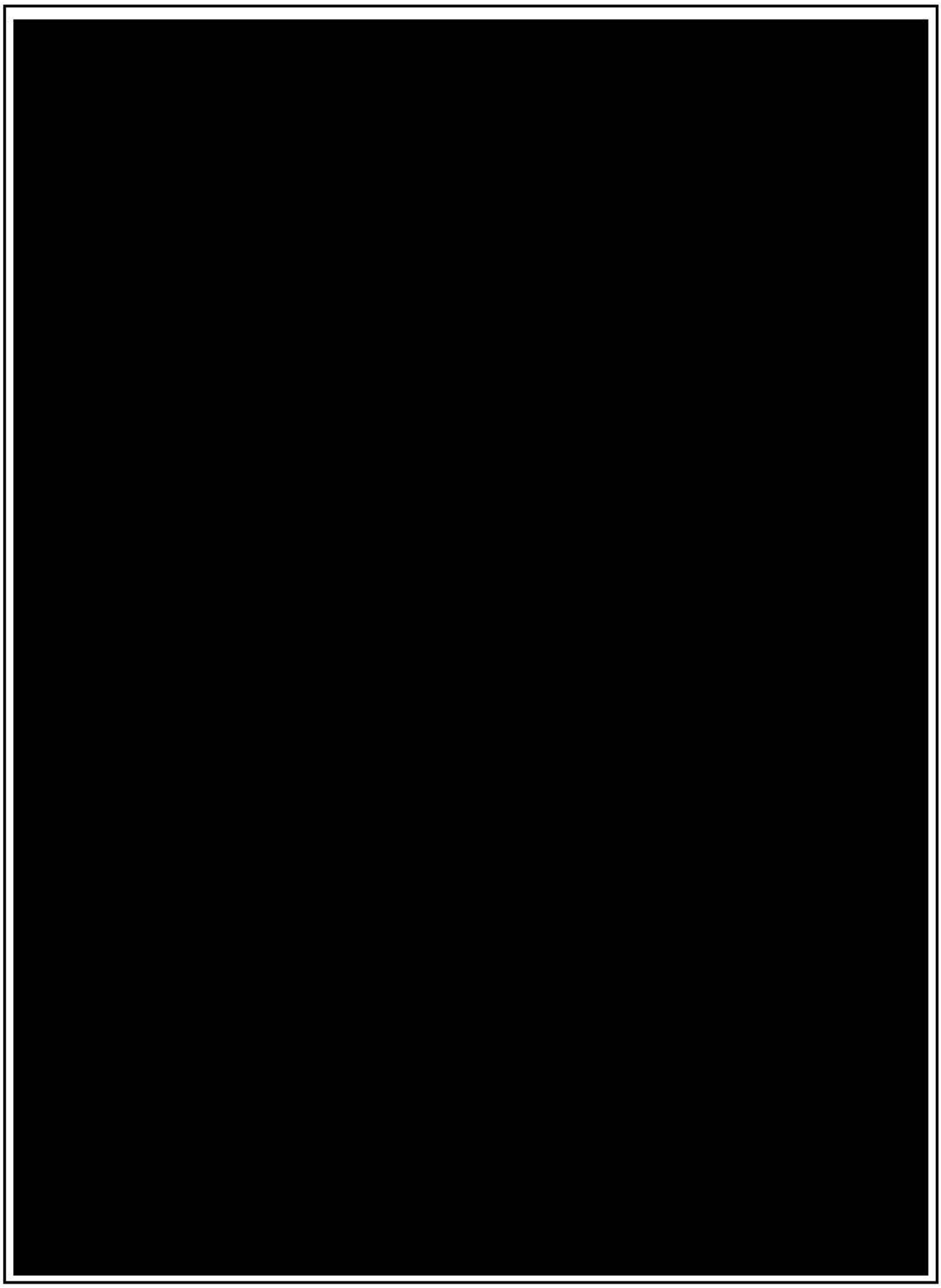


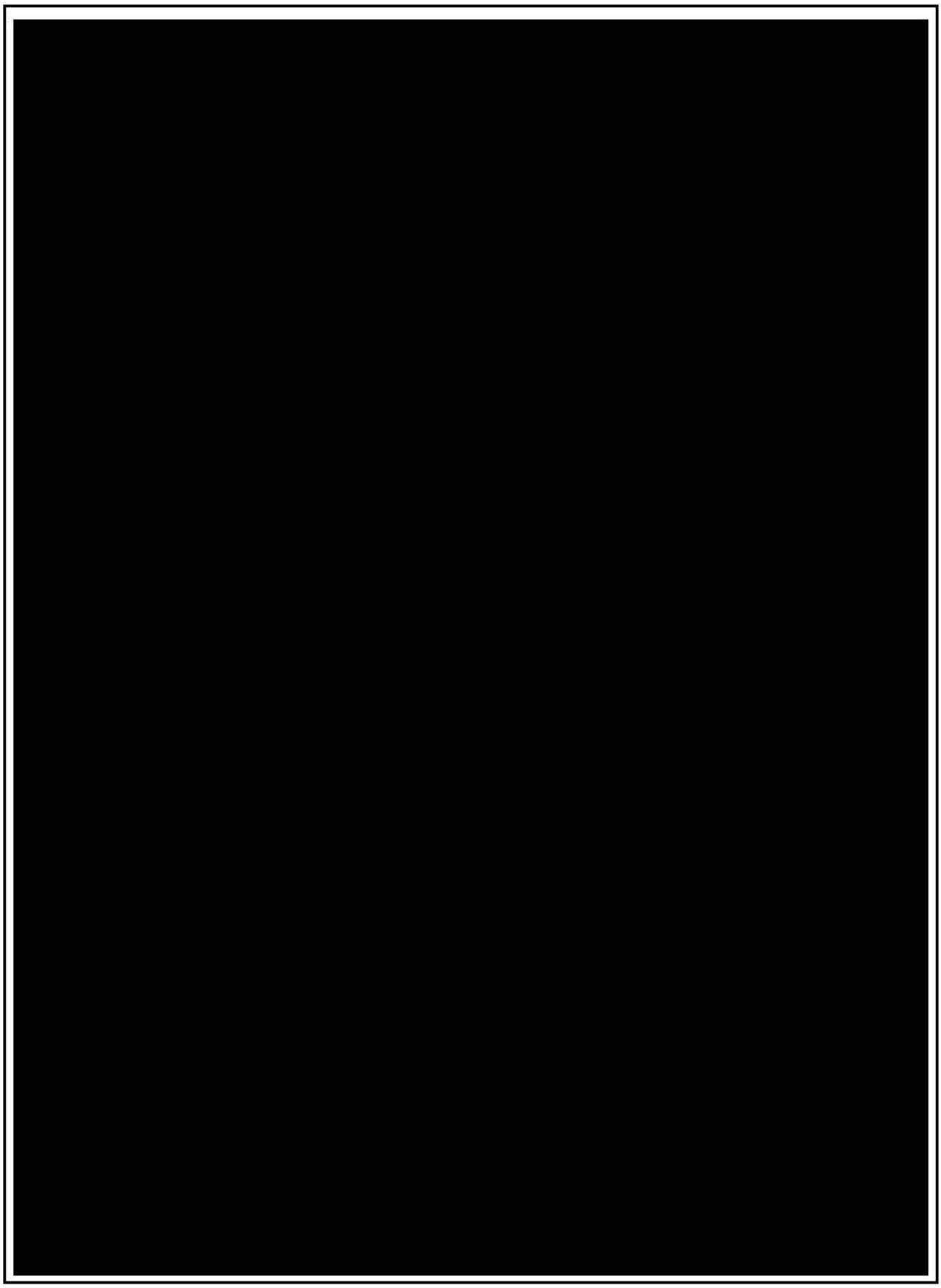


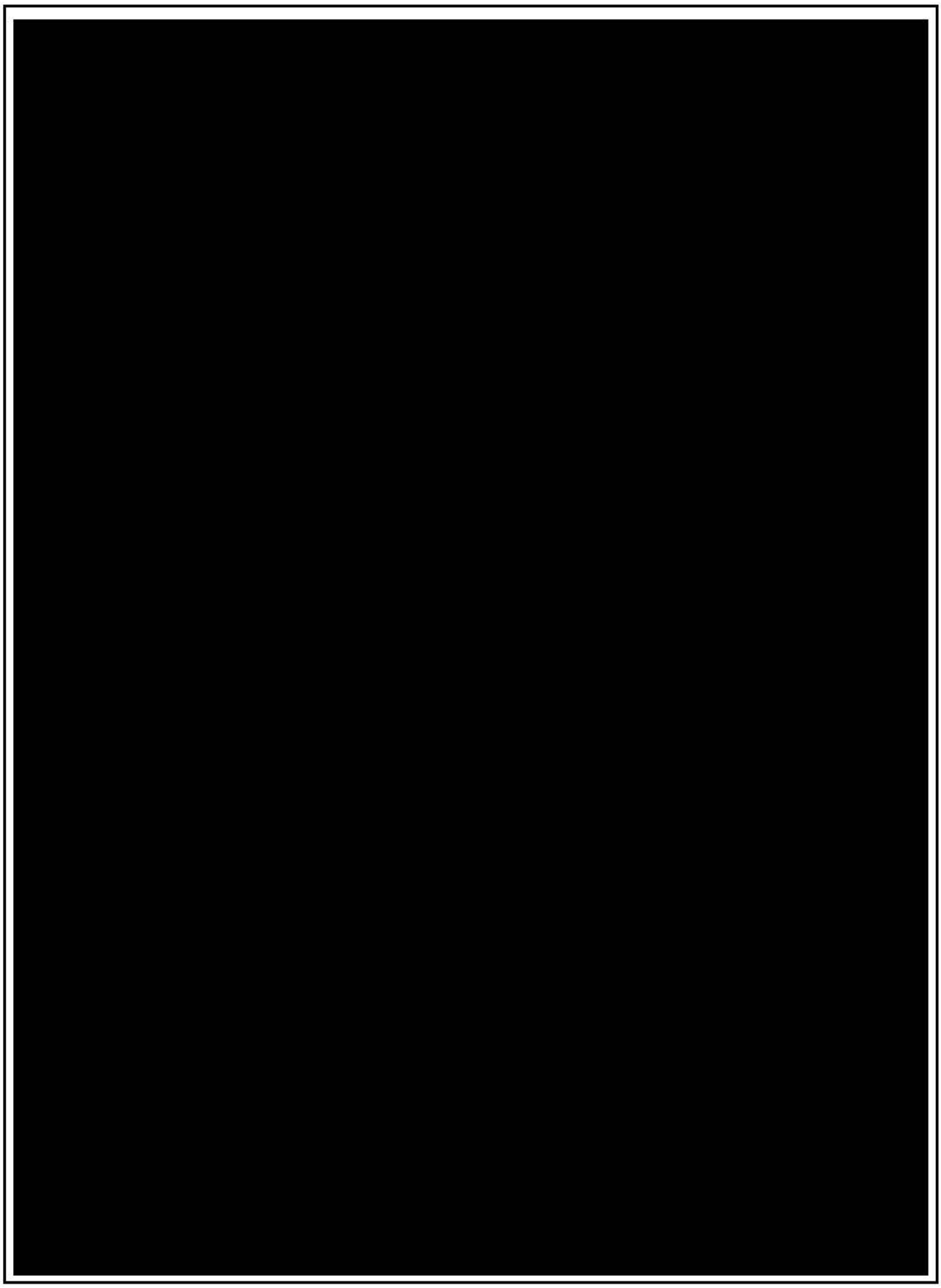


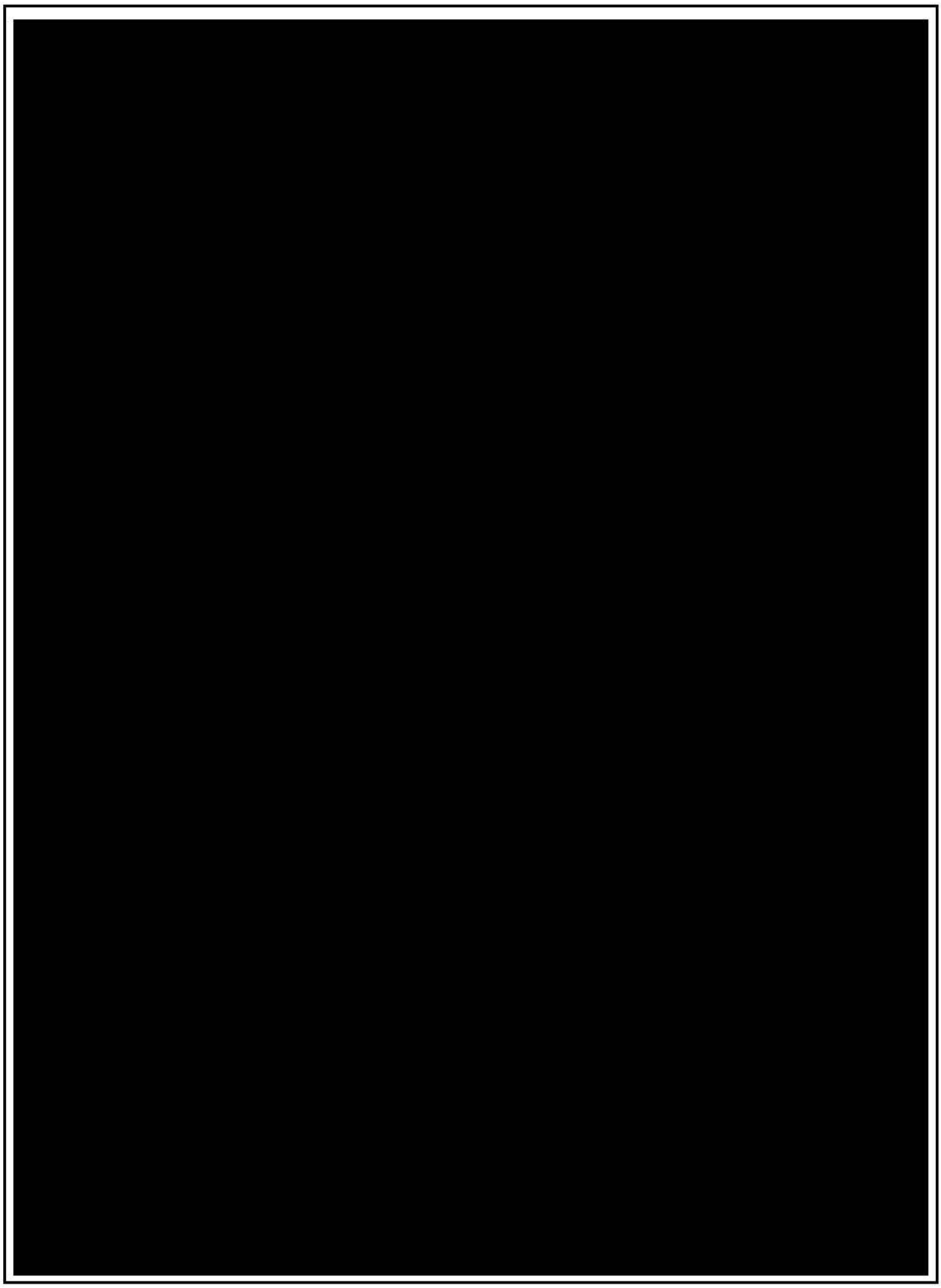


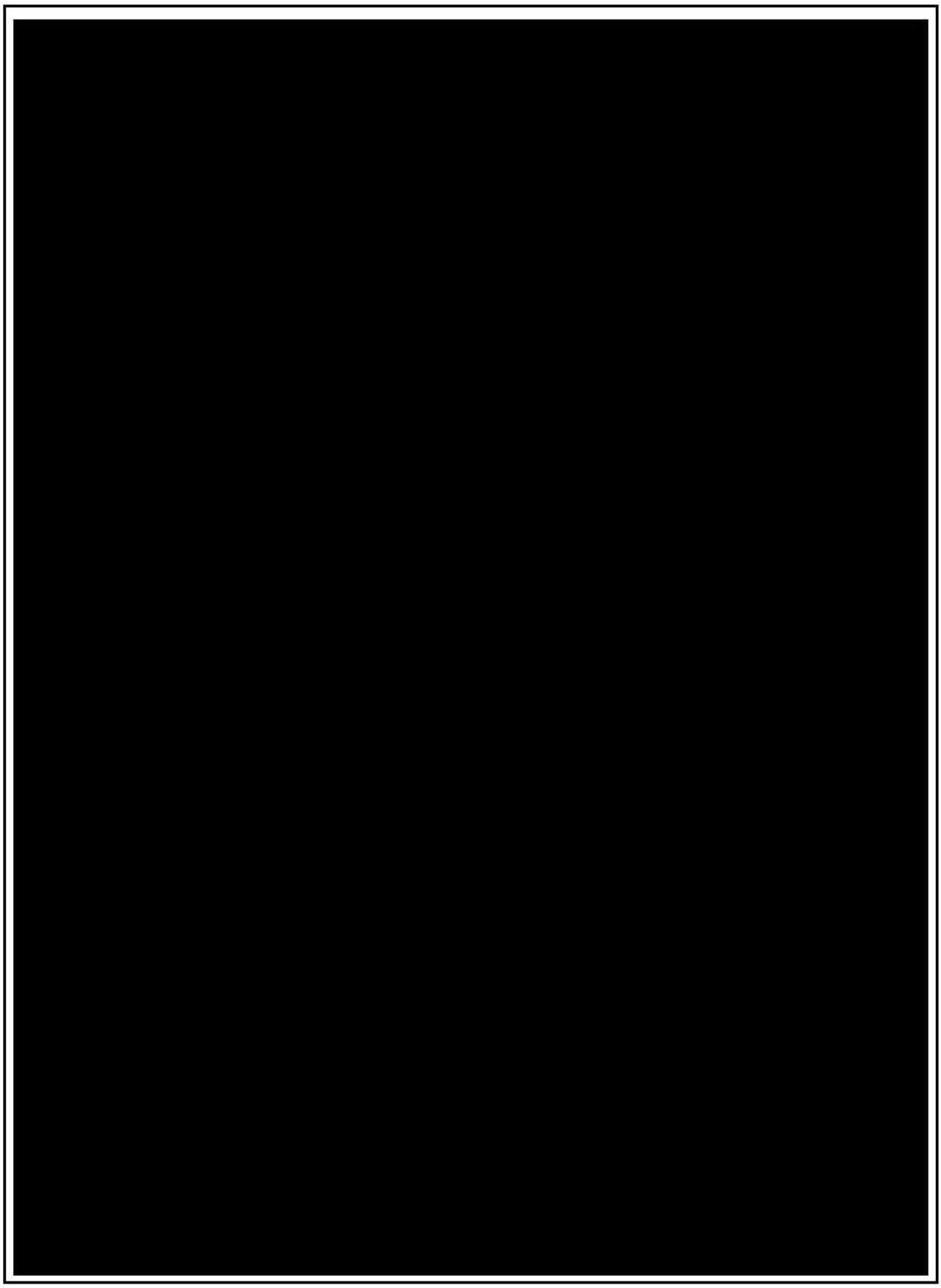


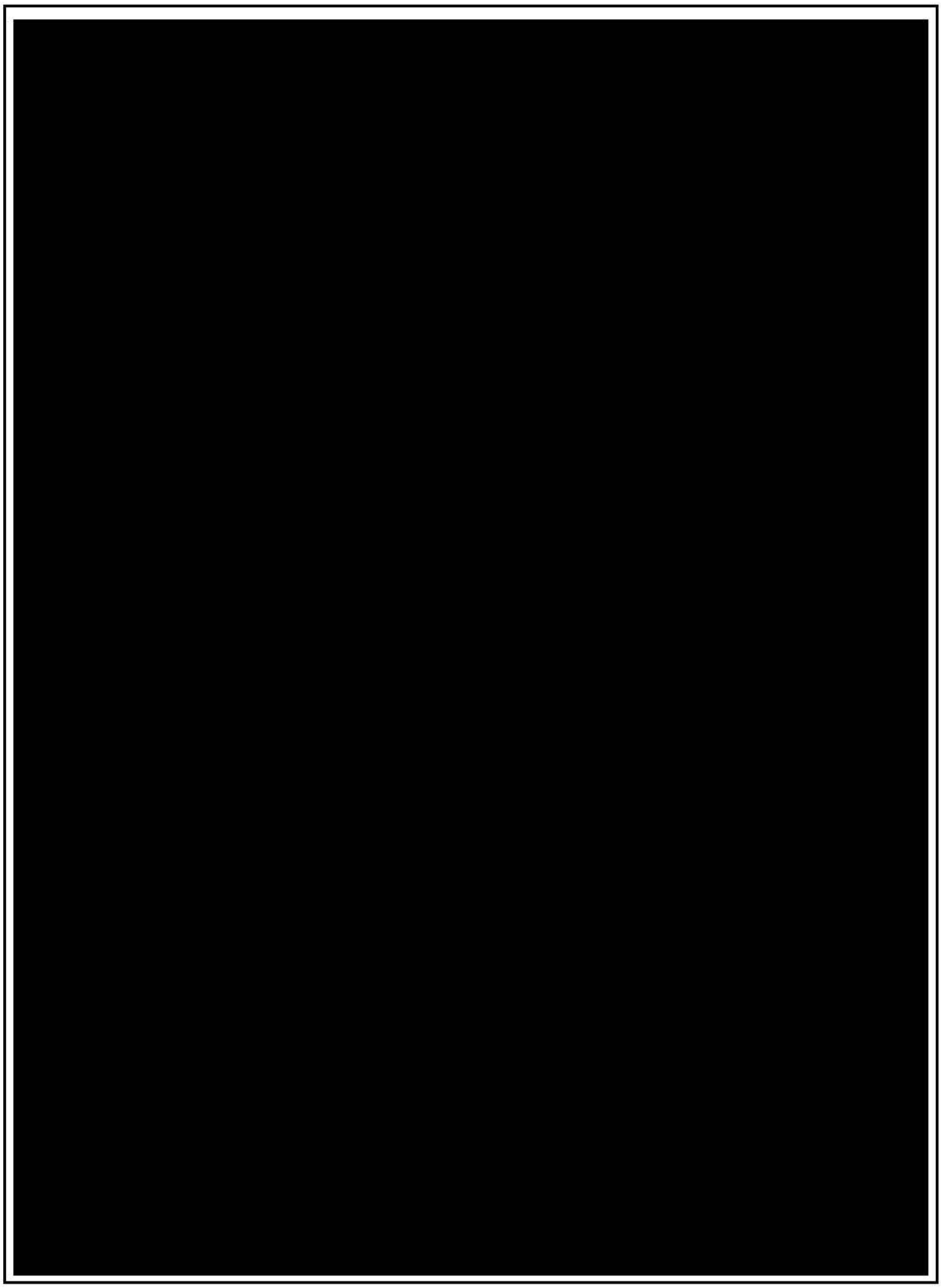


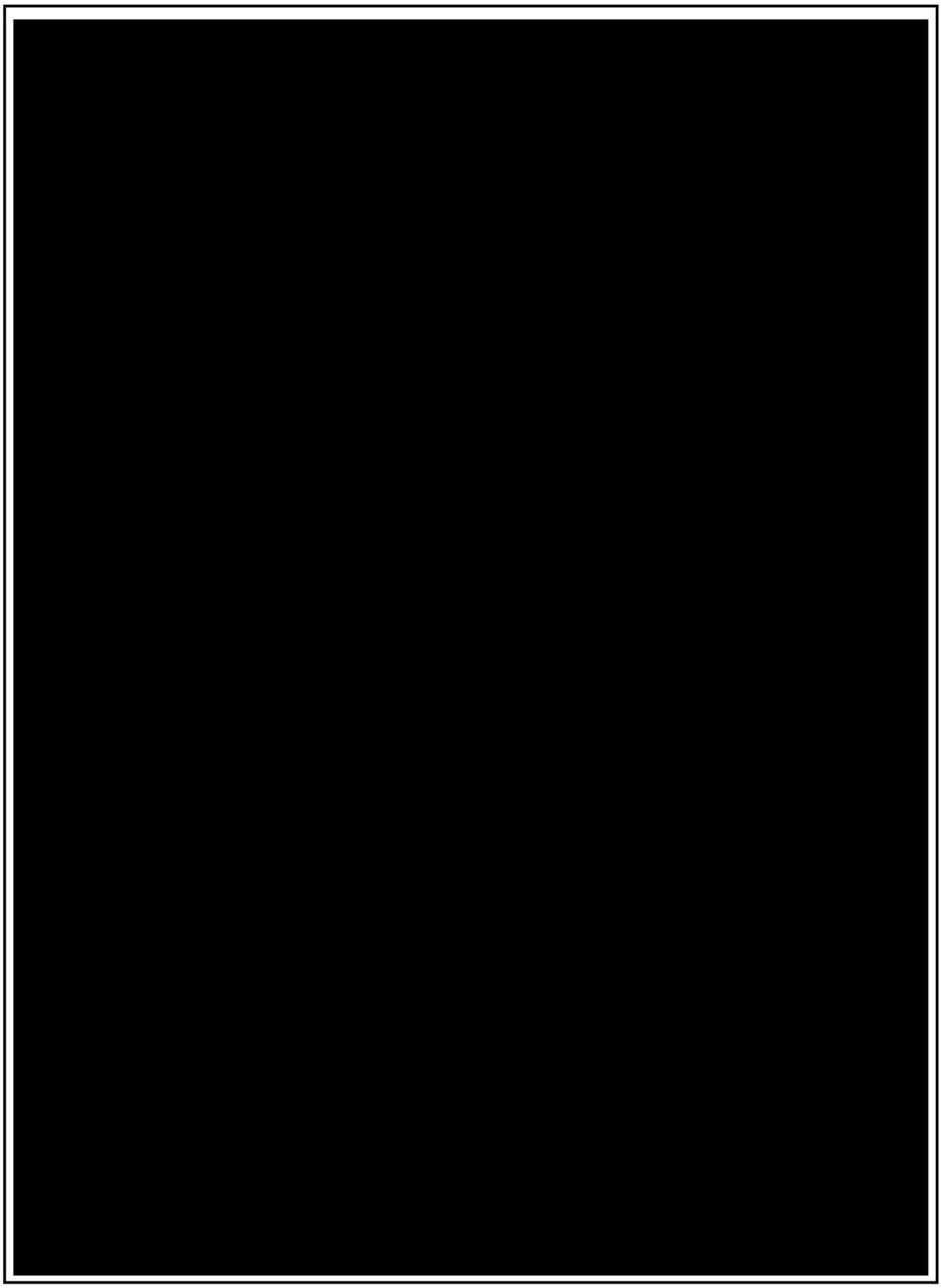


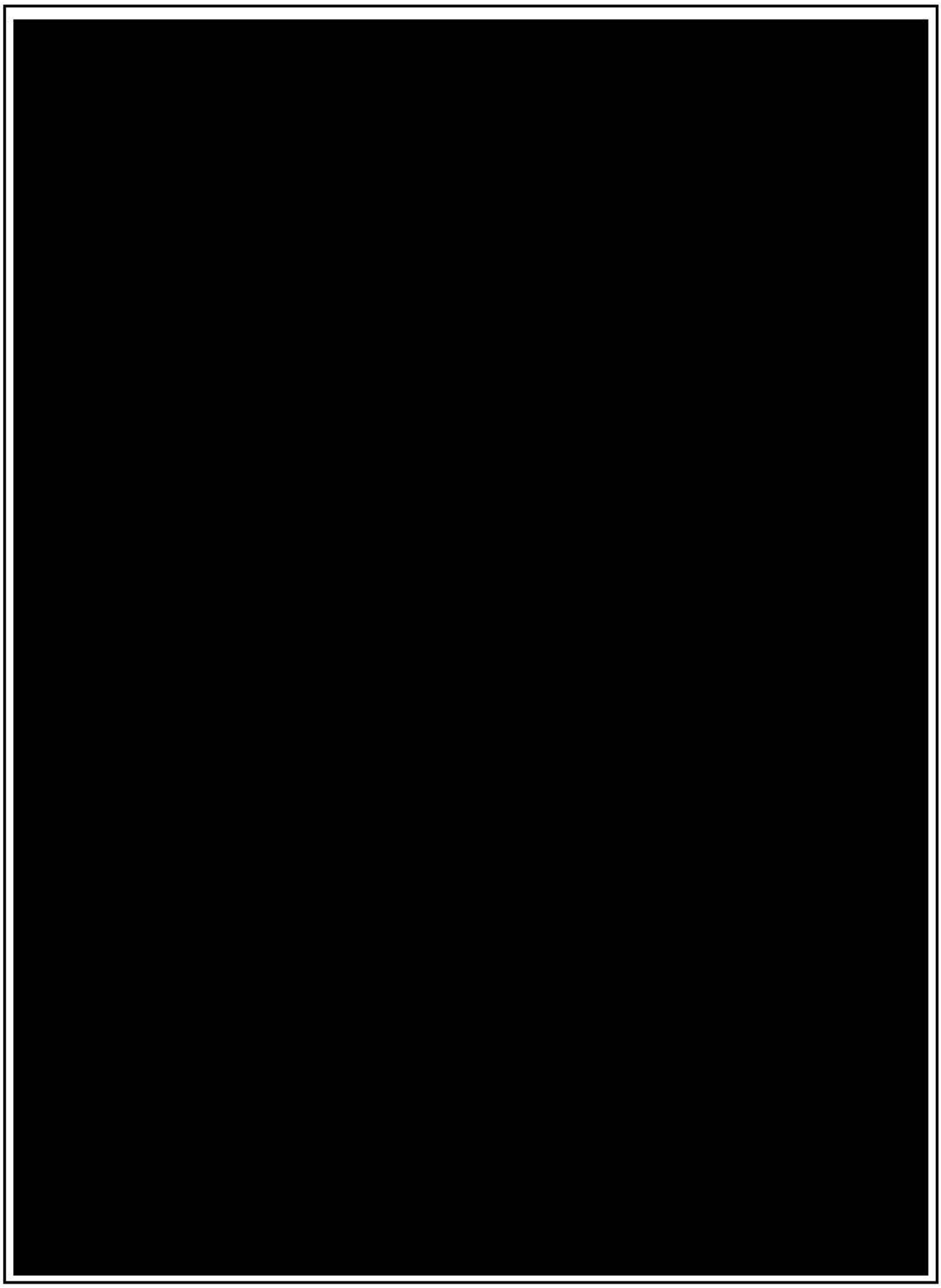


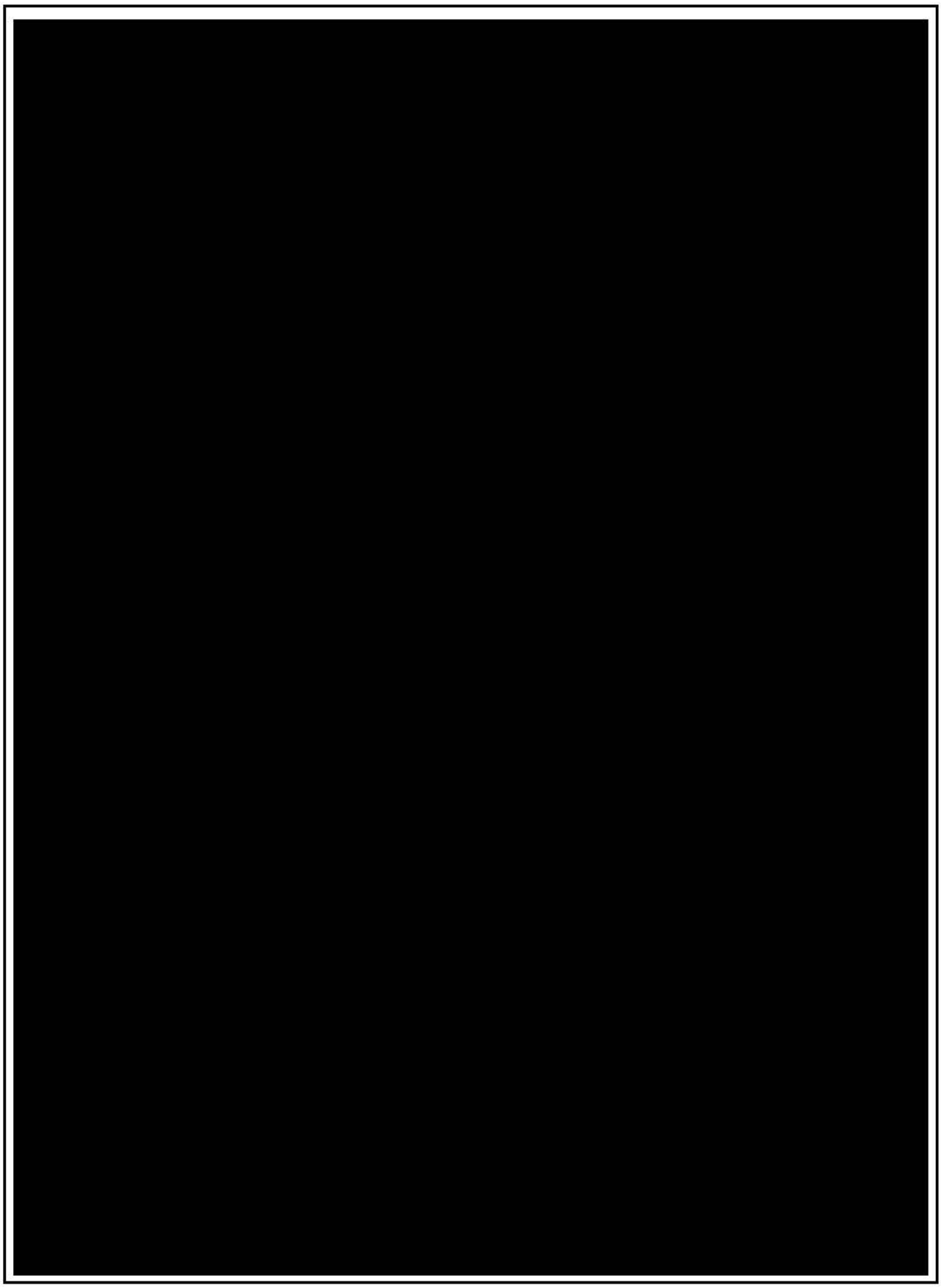












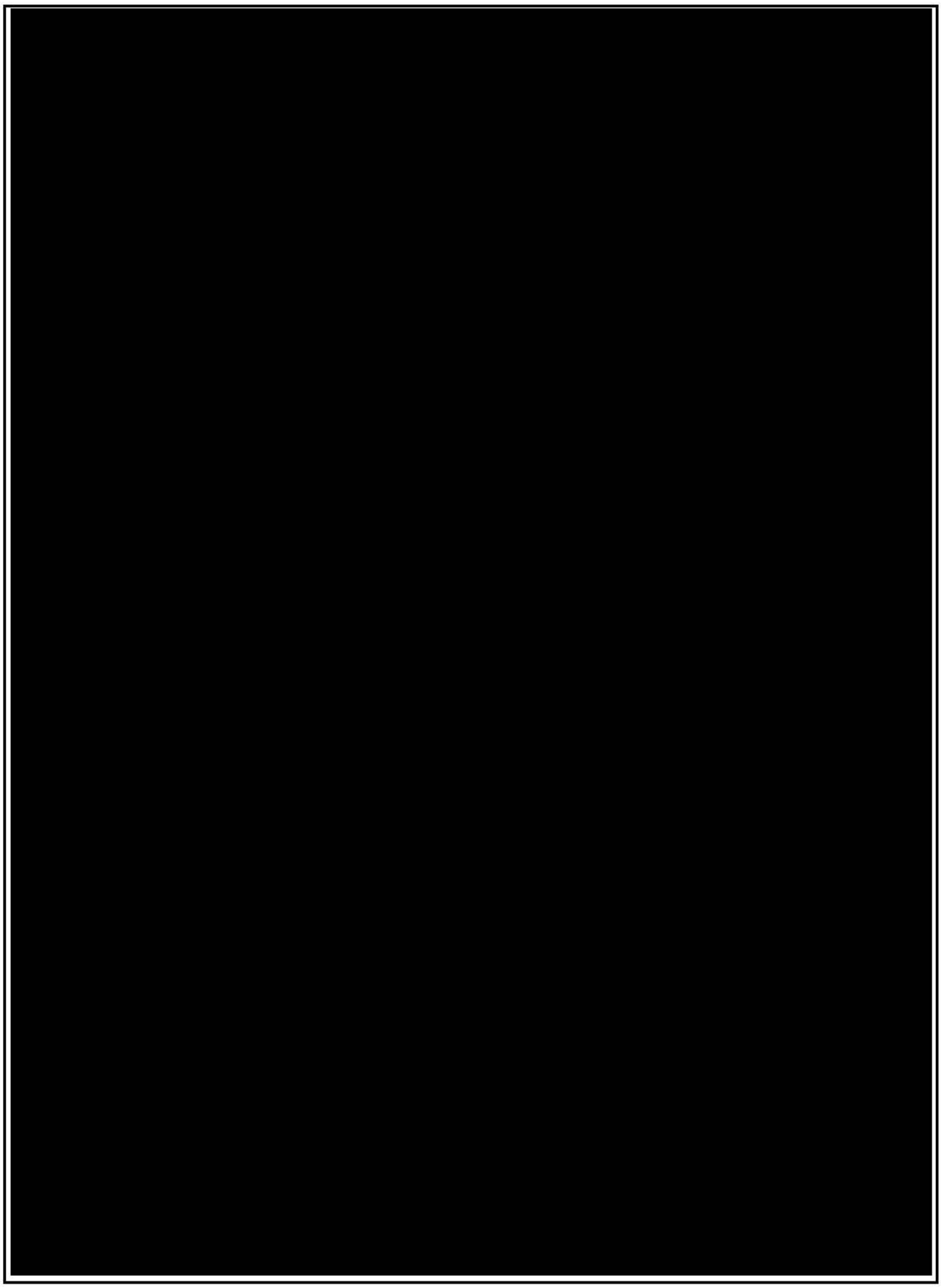


Exhibit G

IN THE UNITED STATES DISTRICT COURT

FOR THE WESTERN DISTRICT OF PENNSYLVANIA

- - -

RESCO PRODUCTS, INC.,	:	
Plaintiff	:	
VS.	:	Civil Action No.:
BOSAI MINERALS GROUP CO., LTD.,	:	2:06-CV-235-JFC
and	:	
CMP TIANJIN CO., LTD.,	:	
Defendants	:	Page 1-108

- - -

Friday, April 18, 2014

- - -

Videotaped Deposition of LAURA LIANG, taken at Boies, Schiller & Flexner, LLP, 5301 Wisconsin Avenue, NW, Washington, DC 20015 commencing at 9:37 a.m. before Sherry L. Brooks, CLR, Professional Court Reporter and Notary Public, in and for the District of Columbia.

- - -

MAGNA LEGAL SERVICES

WWW.MAGNALS.COM

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Representing Defendants

ALSO PRESENT:
Daniel Holmstock, Videographer
Yuan Yuan Li, Interpreter

I N D E X

- - -

TESTIMONY OF: Laura Liang

By Ms. Milici 6

By Mr. Lambiotte 98

E X H I B I T S

EXHIBIT NUMBER	DESCRIPTION	PAGE MARKED
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P R O C E E D I N G S

THE VIDEOGRAPHER: We are now on the record. This begins Videotape Number 1 in the deposition of Laura Liang in the matter of Resco Products, Inc. versus Bosai Minerals Group Company, Limited, et al., pending before the United States District Court for the Western District of Pennsylvania, Case Number 2:06-CV-235.

Today is April 18th, 2014 and the time is 9:37 a.m. This deposition is being taken at the Law Offices of Boies, Schiller, 5301 Wisconsin Avenue, Northwest in Washington, DC at the request of Boies, Schiller.

The videographer is Daniel Holmstock of Magna Legal Services and the court reporter is Sherry Brooks of Magna Legal Services.

For the record, will counsel please introduce themselves and whom they represent?

MS. MILICI: Jennifer Milici from Boies, Schiller & Flexner. I represent plaintiff, Resco.

MR. LAMBIOTTE: Benjamin J. Lambiotte from Garvey Schubert Barer. I represent defendants, Bosai

and CMP and I'll be defending the witness today.

THE VIDEOGRAPHER: Also, present please identify. I have to have it for the record.

MR. YOUNG: Jeff Young, Garvey Schubert Barer for the defendants, Bosai Minerals and CMP Tianjin.

THE VIDEOGRAPHER: Will the court reporter please swear in the interpreter, followed by the witness?

- - -

WHEREUPON,

YUAN YUAN LI,

the Interpreter, after having first been duly sworn to truthfully and accurately interpret the questions asked and responses given, interpreted the testimony as follows:

- - -

WHEREUPON,

LAURA LIANG,

after having been first duly sworn, was examined and testified through the Interpreter as follows:

vote. It counts the hands raised. They wrote down the number and that's all. There's no conclusion on the meeting.

BY MS. MILICI:

Q. Okay. Is that all that you had to clarify?

A. Yes.

Q. Okay. So to make sure that I understand, I think what you said is that the CCCMC staff would ask the companies attending whether they agreed that the quota should increase or that the quota should decrease or that the quota should stop -- that there should stop being a quota and then they would ask people to raise their hands if they agree and then they would count the number of hands raised; is that correct?

A. Yes.

Q. Okay. Was the increase or decrease in the quota proposed by the member companies?

A. Yes.

Q. Is there anything else, other than what we've discussed so far, that you remember about that

ACKNOWLEDGMENT OF DEPONENT

I, _____, do hereby certify that I have read the foregoing pages ___ to ___ and that the same is a correct transcription of the answers given by me to the questions therein propounded, except for the corrections or changes in form or substance, if any, noted in the attached Errata Sheet.

_____ _____

DATE SIGNATURE

Subscribed and sworn to before me this _____ day of _____, 2014.

My commission expires: 11/14/15

_____

Notary Public

Exhibit H

China Chamber of Commerce for Minerals and Chemicals Importers & Exporters Bauxite Branch Rules of Procedure

Chapter 1 General Provision

Rule 1
The rules of procedure are based upon the CCCMC Bauxite Branch Articles of Association, and formulated according to the principles of democratic negotiation, fair participation and self-management.

Rule 2
The rules of procedure are the basic principles and concrete implementation methods for the operation of Bauxite Branch. Their forces are equal to that of the CCCMC Bauxite Branch Articles of Association.

Chapter 2 The Submission, Record and Acceptance of Member's Proposals

Rule 3
The main contents of members' participation in branch meetings include the deliberation of problems specific to the bauxite trade and the work of the branch, and submission of relevant proposals.

Rule 4
The content of member's proposals shall include:
1. Suggestions on the industry coordination bill.
2. Suggestions on bauxite related trade policies.
3. Suggestions on the establishment and development of the branch.
4. Any other business related to bauxite branch and its import and export trade.

Rule 5
Proposal must specify the names of the submitters, and signed by legal representatives of the submitters. The content of the proposal must be clear and precise. In principle, a proposal can have only one specific suggestion, and must include explanation notes.

Rule 6
Proposal must be jointly submitted by more than five member enterprises, reconsidered by more than 15 member enterprises before it can be filed, and put forward to the Members' General Meeting, Members' Special Meeting or Board Meeting for discussion and voting. The government will indicate to the branch the direction of coordination in accordance with the need of macro-management. The branch shall submit corresponding proposal and such proposal goes directly to the Members' General Meeting, Members' Special Meeting or Board Meeting for discussion and voting.

Rule 7
When the Branch Members' General Meeting and Members' Special Meeting are in session, the members shall submit proposals to them. When the meetings are not in session, the members shall submit proposals to the Secretariat of the branch.

Rule 8
When the Branch Members' General Meeting and Members' Special Meeting are not in session, the Secretariat shall upon receipt of the members' proposal, proceed to organize, investigate and ascertain the proposal, seek opinions of the members and governing board in a timely manner, and on the premises of a two-third approval from the members or a resolution from the governing board, reply and process the proposal. If the proposal is denied, the Secretariat must explain the reasons to the submitting members in writing.

Chapter 3 Voting on the Proposal

Rule 9
The Branch Members' General Meeting, Members' Special Meeting and the Branch's Governing Board have the rights to vote on the members' proposal.

Rule 10
The method of voting shall be a cast of votes, with each member given one vote. Due considerations shall be given to member's scale of operation when voting on important issues.

Rule 11
Branch Members' General Meeting and Special Meeting Order of Voting:
1. Examine whether the proposal satisfies the filing criteria.
2. Discuss the proposal.
3. Recite the proposal three times, and each time making amendments as per member's request. The draft shall be final after the third recitation.
4. Cast of vote.
5. Tabulation of votes and calculation of result.
6. Announce the voting result.
7. Signed acknowledgement of the voting results by voters.

Rule 12
The Order of Voting on Proposals for Governing Board Meeting is the same as Rule 11.

Rule 13
To convene the Branch Members' General Meeting and Members' Special Meeting, the quorum stipulated in the articles of association must be met. Resolutions shall be passed only with the approving votes of more than two-thirds of the members present.

Rule 14
To convene the Branch Governing Board Meeting, the quorum stipulated in the articles of association must be met. Resolutions shall be passed only with the approving votes of more than two-thirds of the board members present. All Branch Member Enterprises must be informed immediately about the board resolutions passed.

Rule 15
After voting, all resolution related documents shall be kept as record by the Secretariat.

Chapter 4 Branch Elections

Rule 16
The Branch Members' General Meeting shall elect the Governing Board.

Rule 17
The method of electing the Governing Board and the list of board candidates shall be submitted by the Governing Board preparing for that particular Members' General Meeting. Member enterprise nominated by five other members may also be included in the list of board candidates.

Rule 18
The Governing Board election must be conducted with the "each member one vote" method. Members shall vote on each candidate respectively and the results shall be sorted in descending order according to the number of votes. The first few candidates with majority votes shall be elected as Board Members. When the number of candidates with majority votes is less than the required number for Board Members, there shall be a second round of voting and election based on simple majority. In principle, the number for Board Members is not to be more 30% of total members.

Rule 19
The elected Board Member enterprises shall appoint their personnel to take up position in the Governing Board.

Rule 20
The Governing Board shall elect the President, Vice-President, and Vice-Secretariat, in the order of electing the President first, follow by the Vice-President and Vice-Secretariat. The election shall be conducted via voting. The Board Member with majority votes and the most votes shall be elected.

Rule 21
The Board Member enterprises elected for President, Vice-President and Vice-Secretariat shall appoint their personnel to take position as the President, Vice-President and Vice-Secretariat.

Rule 22
The Secretariat of the branch shall be nominated by the Chairperson of the Chamber of Commerce and elected by the Governing Board.

Chapter 5 Branch Disciplinary Measures

Rule 23
Members shall participate actively in the work of the branch, exercise their rights and entitlements as members, and fulfil their obligations and duties as members. Those who are unable to attend branch meetings and activities must explain their reasons to the Secretariat. Absentees of more than three occasions (including three) without cause, shall be cited and criticized upon motion passed by the Governing Board.

Rule 24
Branch members that do not participate in meetings and voting shall be regarded as voluntary abstention.

Rule 25
All resolutions and coordination bill passed by the resolution of the Members' General Meeting, Special Meetings and Board Meeting shall be deemed as the association regulations. Branch members should observe these regulations conscientiously and implement thoroughly. When opinions differ, members may reflect to the Members' General Meeting, Special Meeting, and Governing Board by submission of proposals. However, members shall maintain compliancy of the resolutions and coordination bill, and not act on their own accord. Any act otherwise shall be regarded as a violation and penalty shall be imposed in accordance with the relevant association regulations.

Rule 26
Branch Governing Board Member must fulfil its duties and responsibilities diligently, and completes all tasks assigned by the branch. It shall explain the reasons and seek the approval of the Governing Board when unable to participate in board meetings and activities or unable to complete task. When a Board Member is absent without cause twice consecutively from board meetings and activities, or unable to complete task, it may relieve its board duties temporarily. Alternate board members and other members shall substitute for its duties.

Chapter 6 Supplementary Provisions

Rule 27
These rules have been adopted by the Branch Members' Resolution passed on March 26, 2003.

Rule 28
The power to interpret these rules is vested in the Branch Governing Board.

Rule 29
These rules shall come into force simultaneously with the "CCCMC Bauxite Branch Articles of Association".

~End

显示文档

中国五矿化工进出口商会

中国五矿化工进出口商会矾土分会议事规则

中国五矿化工进出口商会矾土分会议事规则

第一章 总则

第一条 依据中国五矿化工进出口商会矾土分会章程，按照民主协商、公平参与、自我管理的原则制定本规则。

第二条 本规则是矾土分会运作的基本原则和具体实施办法，与《中国五矿化工进出口商会矾土分会章程》具有同等的效力。

第二章 会员议案的提出、立案和受理

第三条 分会会员参与分会议事的主要内容包括就涉及矾土贸易的专门问题及对本分会有关工作进行审议并提出议案。

第四条 会员议案的内容包括:

(1) 关于行业协调方案的建议;

(2) 关于矾土贸易政策的建议;

(3) 关于分会建设和发展的建议;

(4) 其他涉及矾土分会和进出口贸易的事宜。

第五条 议案必须注明提出议案会员名称，并有提案会员法人签字。议案内容必须简洁清楚，原则上一个议案只能包括一项具体建议。议案必须附议案说明。

第六条 会员议案必须有5家以上会员联名提出方可成为议案；复议会员必 须达到15家以上，该议案方可立案，交分会会员大会、临时会员大会或理事会讨论、表决。政府部门根据宏观管理工作的需要，向分会提出协调意向，分会应据此 制定和提出相应议案。该类议案直接立案交会员大会、临时会员大会或理事会讨论、表决。

第七条 在分会会员大会和临时会员大会开会期间，会员向分会会员大会和临时会员大会提交议案；分会会员大会和临时会员大会闭会期间，会员向分会秘书长提交议案。

第八条 分会秘书长在分会会员大会和临时会员大会闭会期间，接受会员议 案后，应对议案进行分类、调查、核实，并及时征求理事会及会员意见，经三分之二以上会员同意或理事会表决通过的前提下办理和答复。对未予通过的提案，秘书 长须向提出会员单位书面说明原因。

第三章 议案的表决

第九条 分会会员大会、临时会员大会和分会理事会有权对会员议案进行表决。

显示文档

第十条 表决办法采取投票制，每一会员一票。对重要问题的表决，必要时须参考会员的经营业绩比例。

第十一条 分会会员大会和临时会员大会表决程序：

（1）审议议案是否符合立案条件；

（2）对议案进行讨论；

（3）通读议案三次，于每次通读后根据会员要求进行修改，三读后定稿；

（4）大会表决；

（5）计算表决结果；

（6）通报表决结果；

（7）投票人对表决结果签字确认。

第十二条 理事会对议案进行表决时程序同第十一条。

第十三条 分会会员大会和临时会员大会召开需符合章程规定的法定到会人数。在表决时，有到会会员三分之二以上同意即可通过；否则不形成决议。

第十四条 分会理事会召开需符合章程规定的法定到会人数。在表决时，有到会理事三分之二以上同意即可通过；理事会表决结果须立即通知全体分会会员企业。

第十五条 表决后有关表决的文件由分会秘书处存档备案。

第四章 分会选举

第十六条 分会会员大会选举理事会。

第十七条 理事会选举办法和候选理事单位名单由筹备该次会员大会的理事会提出。经5家会员企业共同提名的会员企业也可列入候选名单。

第十八条 理事会的选举必须采用每一会员一票；按会员得票数排序，前若 干得票过半数的会员当选理事单位；如第一批过半数会员不足理事数量，则进行第二轮选举，凭简单多数当选。理事单位数量原则上不超过会员数量的30%。

第十九条 当选理事单位指派人员出任分会理事。

第二十条 理事会选举理事长单位、副理事长单位、副秘书长单位。先选举理事长单位，再选举副理事长单位、副秘书长单位；选举采用表决办法，获选票最多，且过半数的理事单位当选。

第二十一条 当选理事长单位、副理事长单位、副秘书长单位指派人员出任分会理事长、副理事长、副秘书长。

第二十二条 分会秘书长由商会会长提名，经理事会选举通过。

第五章 分会纪律

第二十三条 分会会员应积极参与分会工作，行使会员的权利，履行会员义 务。因故不能参加分会会议和活动的，须向分会秘书长说明原因。无故不参加分会会议和活动达三次以上的（含三次），经理事会通过后对其进行通报批评。

第二十四条 分会会员不参加会议、不参加表决的，按自动弃权论处。

第二十五条 会员大会、临时会员大会、理事会表决通过的决议和协调方案 视为行规，分会会员应自觉遵守并贯彻实施，如有不同意见可通过提案向会员大会、临时会员大会、理事会反映，但在行动上必须与决议和协调方案保持一致，不得 自行其事，否则视为违反行规，按行业有关规定进行处罚。

第二十六条 分会理事必须认真履行职责，完成分会交办的各项工作，因 故无法参加理事会会议、活动，或无法完成工作的，必须向理事会说明原因并获得同意。连续两次无故不参加理事会会议、活动，或无法完成工作的理事，理事

显示文档

会可暂停其理事职务，由候补理事和其他会员代替其工作。

第六章 附则

第二十七条 本规则经2003年3月26日分会全体会员表决通过。

第二十八条 本规则的解释权属于分会理事会。

第二十九条 本规则与《中国五矿化工进出口商会矾土分会章程》同时生效。

Exhibit I

Minute of the Enlarged Council Meeting of the Bauxite Branch

2005 bauxite export quota bidding will get started soon. To fully exert the Bauxite Branch's function of democratic deliberation and be ready for the new phase of bauxite export quota bidding, the CCCMC held an enlarged council meeting of the Bauxite Branch in Fuzhou, Fujian on November 19. Eighty members attended the meeting. Their average total export volume for the last three years accounted for 98.8% of the total export volume of all bauxite businesses in China.

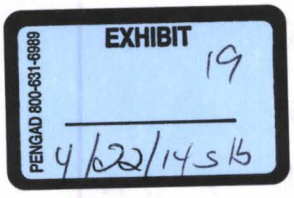
During the meeting, attendee members summarized the situation of 2004 bauxite export market, forecasted the trend of 2005 international market, and discussed how to promote exportation.

According to the Rules of Procedure of the Bauxite Branch of the China Chamber of Commerce of Metals Minerals & Chemicals Importers & Exporters (hereafter referred to as the "Rules of Procedure"), representatives of attendee members presented proposals concerning the 2005 bauxite export quota bidding, deliberated and voted on those proposals. Specific contents are listed as below:

I. Proposed and passed: Negotiated bidding shall not be employed in the 2005 bauxite export quota bidding.

II. Proposed and passed: Weighted average shall be used to evaluate performance.

III. Proposed to maintain the stability of bidding polices. (This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting. The approval ratings approached the passing rate.)



IV. Proposed to use the export performance data of 2004. (This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting. The approval ratings approached the passing rate.)

V. Proposed to set the bauxite export quota at one million metric tons. (This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting. The approval ratings were relatively high.)

VI. Proposed to use "0" as the value of the variable "Y" for bidding parameters. (This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting. The approval ratings were relatively high.)

VII. Proposed to use the performance data from 2001 to 2003 for the 2005 bidding. (This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting. The approval ratings were relatively high.)

VIII. Proposed to set 180 as the minimum price for 2005 export quota. (This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting. The approval ratings were relatively high.)

IX. Proposed to set the bid security at the percentage of 10%. (This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting. The approval ratings were relatively high.)

X. Proposed to repeal the bidding parameter "S". (This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting. The approval ratings were relatively high.)

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矾土分会理事会扩大会议纪要

2004.纪要.

2005 年矾土招标工作即将全面展开，为充分发挥分会的民主协商议事的作用，为新一轮招标工作做好前期准备，我会于 11 月 19 日在福建省福州市召开矾土分会理事会扩大会议。参会企业共计 80 家，其前三年平均出口总量占全国企业出口量的 98.8%。

会上，参会企业对 2004 年的矾土出口市场情况进行了总结，对 2005 年国际市场形势进行了预测，对如何促进出口工作发展进行了研讨。

参会企业代表根据《中国五矿化工进出口商会矾土分会？？议事规则》，就 2005 年矾土招标的有关问题提出了议案，并进行了审议表决。具体内容如下：

一、 提议并通过：2005 年招标不要设立协议标。

二、 提议并通过：业绩应加权平均。

三、 提议保持招标政策稳定。（此提案按照分会议事规则审理未获通过，但支持率接近通过值。）

四、 提议使用 2004 年出口业绩。（此提案按照分会议事规

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则审理未获通过，但支持率接近通过值。）

五、提议配额总量设为 100 万吨。（此提案按照分会议事规则审理未获通过，但支持率较高。）

六、提议招标系数 Y 值设为 0。（此提案按照分会议事规则审理未获通过，但支持率较高。）

七、提议 2005 年使用业绩年限为 2001-2003 年。（此提案按照分会议事规则审理未获通过，但支持率较高。）

八、提议 2005 年配额低价为 180 元。（此提案按照分会议事规则审理未获通过，但支持率较高。）

九、提议保证金比例 10%。（此提案按照分会议事规则审理未获通过，但支持率较高。）

十、提议不要招标系数 S。（此提案按照分会议事规则审理未获通过，但支持率较高。）

Exhibit J

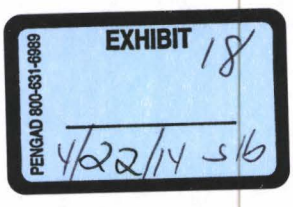
Minute of the Enlarged Council Meeting of the Bauxite Branch

Pursuant to the requirements of the Committee for the Invitation for Bid for Export Commodity Quotas of the Ministry of Commerce, the preparation work for the first bidding of 2007 will start ahead of schedule. Meanwhile, as the EDI center of the Ministry of Commerce revised the bidding procedure, it is necessary to train future bidding members on the operation procedure. Therefore, the CCCMC held an enlarged council meeting of the Bauxite Branch at the Kunming Xinjiyuan (New Era) Hotel on September 15. Sixty-nine members attended the meeting. Their total export volume accounted for 87.67% of the total export volume of all bauxite businesses in China. The total value of their export accounted for 88.22% of the total export value of all bauxite businesses in China.

At the meeting, attendee members summarized the situation of the bauxite export market for the first three quarters of 2006, analyzed some currently existing problems, and forecasted the market trend of the fourth quarter.

Attendee members presented proposals regarding 2007 bauxite export quota bidding, and deliberated and voted on those proposals pursuant to the Rules of Procedure of the Bauxite Branch of the China Chamber of Commerce of Metals Minerals & Chemicals Importers & Exporters (hereafter referred to as the "Rules of Procedure"). Concrete contents are listed as below:

I. Proposed to increase categories for the maximum bid size, favoring small and medium-sized businesses. This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting. The approval



ratings were relatively high. 73.91 % of the attendee members supported this proposal and their total export volume accounted for 38.23% of the total export volume of all attendee members.

II. Proposed to set the bauxite export quota at 1 million metric tons for 2007. This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting. The approval ratings were relatively high. 63.77% of the attendee members supported this proposal and their total export volume accounted for 56.33% of the total export volume of all attendee members.

III. Proposed to maintain the level of bauxite export quota at 970,000 metric tons for 2007. This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting.

IV. Proposed to maintain the level of average annual minimum bauxite supply at 20,000 metric tons. This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting.

V. Proposed to set the average annual minimum bauxite supply at 10,000 metric tons. This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting.

VI. Proposed to set the average annual minimum export volume at 3,000 metric tons. This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting.

VII. Proposed to establish both open bidding and negotiated bidding. This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting.

VIII. Proposed to set the minimum price for 2007 bauxite export quota at 130/ton. This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting.

IX. Proposed to set the minimum price for 2007 bauxite export quota at 100/ton. This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting.

X. Proposed to set the minimum price for 2007 bauxite export quota at 60/ton. This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting.

XI. Proposed to set the minimum price for 2007 bauxite export quota at 80/ton. This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarge meeting.

XII. Proposed to use "0" as the value of the variable "Y". This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting.

XIII. Proposed to use "0.3" as the value of the variable "Y". This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting.

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矾土分会理事会扩大会议情况报告 2006.

根据商务部招标委员会的要求，2007 年第一次招标筹备工作要提前开始，同时由于商务部 EDI 中心对投标程序做了修改，需要对投标企业进行程序操作培训。鉴此，我会于 9 月 15 日在昆明新纪元酒店召开矾土理事会扩大会议。参会企业共计 69 家，出口量占全国企业出口量的 87.67%，出口额占全国企业出口额的 88.22%。

会上，参会企业总结了 2006 年前三季度的矾土出口市场形势，剖析了当前存在的一些问题，并对第四季度的市场形势作了预测。

参会企业代表根据议事规则，就 2007 年矾土招标的有关问题提出了议案，并进行了审议表决。具体内容如下：

一、建议最高投标量增加分档，倾斜中小企业。此提案按照议事规则审理未获通过，但支持率较高，同意数占签到数 73.91%，同意企业出口量占签到企业出口量 38.23%。

二、建议将 2007 年矾土出口配额总量设为 100 万吨。此提案按照议事规则审理未获通过，但支持率较高，同意数占签到数 63.77%，同意企业出口量占签到企业出口量 56.33%。

三、建议维持 2007 年矾土出口配额总量为 97 万吨。此提案按照议事规则审理未获通过。

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四、建议维持最低年均供货数量为 20000 吨。此提案按照议事规则审理未获通过。

五、建议将最低年均供货数量设为 10000 吨。此提案按照议事规则审理未获通过。

六、建议最低年均出口业绩 3000 吨。此提案按照议事规则审理未获通过。

七、建议分公开和协议招标。此提案按照议事规则审理未获通过。

八、建议 2007 年矾土出口配额底价 130 元/吨。此提案按照议事规则审理未获通过。

九、建议 2007 年矾土出口配额底价 100 元/吨。此提案按照议事规则审理未获通过。

十、建议 2007 年矾土出口配额底价 60 元/吨。此提案按照议事规则审理未获通过。

十一、建议 2007 年矾土出口配额底价 80 元/吨。此提案按照议事规则审理未获通过。

十二、建议将 Y 值设为 0。此提案按照议事规则审理未获通过。

十三、建议将 Y 值设为 0.3。此提案按照议事规则审理未获通过。

Exhibit K

Minute of the Enlarged Council Meeting of the Bauxite Branch

2008 bauxite export quota bidding will get started soon. To fully exert the Bauxite Branch's function of democratic deliberation and be ready for the new phase of bauxite export quota bidding, the CCCMC held an enlarged council meeting of the Bauxite Branch in Hefei, Anhui on September 18. Sixty-one members attended the meeting. Their average total export volume for the last three years accounted for 96.04% of the total export volume of all bauxite businesses in China. The average total value of their export for the last three years accounted for 96% of the total export value of all bauxite businesses in China.

At the meeting, attendee members analyzed and reviewed the situation of the bauxite export market for the first three quarters of 2007, forecasted and discussed the development trend of international market, and debated specific bidding parameters.

Attendee members presented proposals regarding 2008 bauxite export quota bidding, and deliberated and voted on those proposals pursuant to the Rules of Procedure of the Bauxite Branch of the China Chamber of Commerce of Metals Minerals & Chemicals Importers & Exporters (hereafter referred to as the "Rules of Procedure"). Concrete contents are listed as below:

I. Proposed to set the bauxite export quota for 2008 at: 950,000 metric tons, 8.20 % of the attendee members supported this proposal and their total export volume accounted for 17.36% of the total export volume of all attendee members; 1,000,000 metric tons, 34.43 % of the attendee members supported this proposal and their total export volume accounted for 25.31% of the total export volume of

all attendee members; 1,100,000 metric tons, 50.82 % of the attendee members supported this proposal and their total export volume accounted for 51.02% of the total export volume of all attendee members. None of the foregoing three proposals passed the enlarged council meeting pursuant to the Rules of Procedure. However, as to an export quota of 1,000,000 metric tons or more, 85.25 % of the attendee members (that is, the sum of the attendee members which approved a quota of 1,000,000 metric tons or 1,100,000 metric tons) supported it and their total export volume accounted for 76.33% of the total export volume of all attendee members. Thus, a proposal to set a bauxite export quota of 1,000,000 metric tons or more has met requirements to pass the enlarged council meeting.

II. With respect to a proposal that any bauxite export business must export at least 2,000 metric tons of bauxite on average annually, 42.62 % of the attendee members supported it and their total export volume accounted for 84.92% of the total export volume of all attendee members; or a proposal to maintain the level of the average annual minimum export volume for a business at 100 metric tons, 55.74 % of the attendee members supported it and their total export volume accounted for 15.08% of the total export volume of all attendee members. Thus, none of the foregoing two proposals passed the enlarged council meeting pursuant to the Rules of Procedure.

III. With respect to a proposal to set the minimum bid size at 2,000 metric tons, 42.62 % of the attendee members supported this proposal and their total export volume accounted for 74.23% of the total export volume of all attendee members; or a proposal to maintain the level at 300 metric tons, 55.74 % of the attendee

members supported this proposal and their total export volume accounted for 15.08% of the total export volume of all attendee members. Thus, none of the foregoing two proposals passed the enlarged council meeting pursuant to the Rules of Procedure.

IV. Proposed to enhance future bidding members' qualification requirements. 18.03 % of the attendee members supported this proposal and their total export volume accounted for 64.94% of the total export volume of all attendee members. This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting.

V. Proposed to set the ratio of biddable volume to the total available quota of the bidding at 130: 100. 4.92 % of the attendee members supported this proposal and their total export volume accounted for 3.09% of the total export volume of all attendee members. This proposal was deliberated pursuant to the Rules of Procedure, but failed to pass in the enlarged council meeting.

VI. In addition, seven businesses proposed jointly: 1. Prior to the bidding of next quarter, government should designate a group of qualified bauxite manufacturing businesses as export base businesses, that is, companies of which not only the annual output reaches 150,000 metric tons, but also measures in environment protection and social security meet nation's requirements. Trade companies must purchase export products from base businesses. Moreover, trade companies' biddable volume shall be determined by the receipts of value-added taxes from last year, which the trade companies obtained when they purchase export products from base businesses. Therefore, businesses which do not comply with nation's

industry policies can be reduced. 2. Encourage bauxite industry's healthy and orderly development, increase the biddable volume of manufacturing businesses year by year, and decrease the biddable volume of trade companies. That is, it should be considered to increase export manufacturing businesses' biddable volume by 10% to 20% and decrease trade companies' biddable volume by 10% to 20% in 2008.

Note: attachment to the minute of the Enlarged Council Meeting of the Bauxite Branch (2007)

Investigation Report (Overall Situation)

Voting on proposals concerning 2008 bauxite export quota bidding (bauxite) October 18, 2007

Proposal	Parameter	Approval number	Number of attendee members	Approval Ratings among attendee members %	Approval ratings among all bauxite businesses in China %	Ratio of approving members' export volume to the total export volume of attendee members %	Ratio of approving members' export volume to the total export volume of all bauxite businesses in China %	Ratio of approving members' export value to the total export value of attendee members %	Ratio of approving members' export value to the total export value of all bauxite businesses in China %	Weighted approval ratings among attendee members %	Weighted approval ratings among all bauxite businesses in China %
2008 export quota	950,000 tons	5	61	8.20	6.41	17.36	16.68	18.08	17.35		
	1,000,000 tons	21	61	34.43	26.92	25.31	24.31	29.19	28.02		
	1,100,000 tons	31	61	50.82	39.74	51.02	49.01	45.64	43.81		

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Proposal	Parameter	Approval number	Number of attendee members	Approval Ratings among attendee members %	Approval ratings among all bauxite businesses in China %	Ratio of approving members' export volume to the total export volume of attendee members %	Ratio of approving members' export volume to the total export volume of all bauxite businesses in China %	Ratio of approving members' export value to the total export value of attendee members %	Ratio of approving members' export value to the total export value of all bauxite businesses in China %	Weighted approval ratings among attendee members %	Weighted approval ratings among all bauxite businesses in China %
Average minimum export volume of export businesses	2,000 tons	26	61	42.62	33.33	84.92	81.56	82.86	79.55		
	100 tons	34	61	55.74	43.59	15.08	14.49	17.14	16.45		
Minimum amount of a bid	2,000 tons	26	61	42.62	33.33	74.23	71.29	71.07	68.23		
	300 tons	34	61	55.74	43.59	25.77	24.75	28.93	27.77		
Bidding qualifications	Enhance	11	61	18.03	14.10	64.94	62.37	60.94	58.50		
	Maintain	49	61	80.33	62.82	35.06	33.68	39.06	37.50		

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Proposal	Parameter	Approval number	Number of attendee members	Approval Ratings among attendee members %	Approval ratings among all bauxite businesses in China %	Ratio of approving members' export volume to the total export volume of attendee members %	Ratio of approving members' export volume to the total export volume of all bauxite businesses in China %	Ratio of approving members' export value to the total export value of attendee members %	Ratio of approving members' export value to the total export value of all bauxite businesses in China %	Weighted approval ratings among attendee members %	Weighted approval ratings among all bauxite businesses in China %
Ratio of biddable amount to amount of bidding at 130:100	Agree	3	61	4.92	3.85	3.09	2.97	2.70	2.59		
	Disagree	57	61	93.44	73.08	96.91	93.08	97.30	93.41		

CCCMC

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调查报告（总体情况）

关于2008年矾土配额招标有关问题的议案表决（矾土） 2007.10.18

表决项目	参数	同意数	签到数	同意数占签到数%	同意数占全国数%	同意企业出口量占签到企业出口量%	同意企业出口量占全国企业出口量%	同意企业出口额占签到企业出口额%	同意企业出口额占全国企业出口额%	同意企业权数占签到企业权数%	同意企业权数占全国企业权数%
2008年配额总量	95万吨	5	61	8.20	6.41	17.36	16.68	18.08	17.35		
	100万吨	21	61	34.43	26.92	25.31	24.31	29.19	28.02		
	110万吨	31	61	50.82	39.74	51.02	49.01	45.64	43.81		
出口企业最低平均出口量	2000吨	26	61	42.62	33.33	84.92	81.56	82.86	79.55		
	100吨	34	61	55.74	43.59	15.08	14.49	17.14	16.45		
最低投标量	2000吨	26	61	42.62	33.33	74.23	71.29	71.07	68.23		
	300吨	34	61	55.74	43.59	25.77	24.75	28.93	27.77		
关于投标资质	上调	11	61	18.03	14.10	64.94	62.37	60.94	58.50		

五矿化工商会

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表决项目	参数	同意数	签到数	同意数占签到数%	同意数占全国数%	同意企业出口量占签到企业出口量%	同意企业出口量占全国企业出口量%	同意企业出口额占签到企业出口额%	同意企业出口额占全国企业出口额%	同意企业权数占签到企业权数%	同意企业权数占全国企业权数%
	维持现状	49	61	80.33	62.82	35.06	33.68	39.06	37.50		
投标量为标量的130%	同意	3	61	4.92	3.85	3.09	2.97	2.70	2.59		
	不同意	57	61	93.44	73.08	96.91	93.08	97.30	93.41		

五矿化工商会

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Exhibit L

[redacted]