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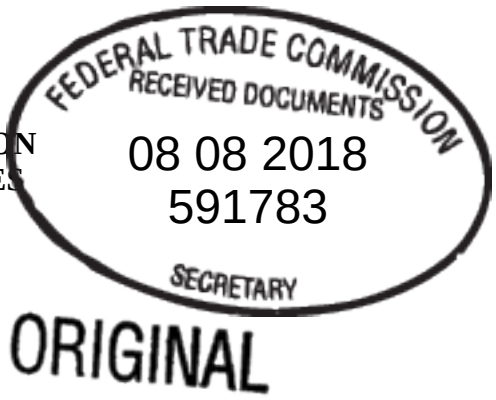

ORIGINAL

UNITED STATES OF AMERICA
BEFORE THE FEDERAL TRADE COMMISSION
OFFICE OF ADMINISTRATIVE LAW JUDGES

In the Matter of Tronox Limited a corporation, National Industrialization Company (TASNEE) a corporation, National Titanium Dioxide Company Limited (Cristal) a corporation, And Cristal USA Inc. a corporation.	)	Docket No. 9377

RESPONDENTS' POST-TRIAL BRIEF

TABLE OF CONTENTS

Page

INTRODUCTION 1

BACKGROUND 4

A. Titanium Dioxide (TiO2) 4

B. The TiO2 Industry 6

C. The Merging Parties 11

1. Tronox, Limited 11

2. Cristal 11

D. Competing TiO2 Suppliers 12

E. TiO2 Customers 14

F. Tronox History 17

a. Bankruptcy 17

b. Price Cycles and Production Reductions 18

c. Negative Consequences for Tronox Despite Production Reductions 19

G. Competitive Strategy 20

H. Deal Rationale 20

I. The Tronox-Cristal Transaction 21

J. Due Diligence 23

K. Confirmatory Due Diligence 26

L. FTC Actions, Expiration Of Long-Stop Date 27

M. Procedural History of Part 3 Proceedings 28

ARGUMENT 29

I. COMPLAINT COUNSEL RELIES ON SELECTIVE AND INCOMPLETE EVIDENCE THAT CANNOT BE CREDITED 31

A. Complaint Counsel Has Selectively Relied On A Small And Unrepresentative Sample of TiO2 Customers 31

B. The Testimony of Paul Malichky, Representing PPG, Is Unreliable And Cannot Be Credited. 33

C. Complaint Counsel's Economist's Testimony Is Not Reliable And Cannot Be Credited. 41

II. COMPLAINT COUNSEL HAS FAILED TO MEET ITS EVIDENTIARY BURDEN 46

A. Complaint Counsel Has Failed To Prove Its Proposed Relevant Market. 46

1. Complaint Counsel Has Failed To Prove Its Proposed Geographic Market 46

a. TiO2 Customers Can Turn To Global Trade In Response To A SSNIP. 47

b. Prices In North America Are Co-Integrated With Global Prices. 48

c. In The North America Geographic Market, A Hypothetical Monopolist Would Not Be Able To Impose A SSNIP. 50

2. Complaint Counsel Has Failed To Prove Its Proposed Product Market. 50

3. Complaint Counsel Cannot Show A Presumption Of Anticompetitive Effects. 53

B. Complaint Counsel Has Failed To Show That Post-Acquisition Unilateral Output Reduction Is Likely. 54

C. Complaint Counsel Has Failed To Show That Post-Transaction Coordination Is Likely. 57

1. Coordination Is Not Possible Because TiO2 Prices Are Individually Negotiated With Customers And Subject To Fierce Competition. 58

2. Price Increase Announcements Do Not Demonstrate Coordination And Are A Legitimate Part Of The Competitive Process. 59

3. Output Reductions Do Not Demonstrate Coordination And Reflect Sound Business Decisions. 60

4. Complaint Counsel's References To Price-Fixing Cases Are Inapposite. 61

5. Tronox Has No Incentive To Coordinate With Competitors As A Result Of The Proposed Acquisition. 63

D. The Acquisition Will Result In Substantial Synergies That Enhance Output, Lower Costs, And Improve Competition For The Benefit Of Consumers. 64

1. The Proposed Transaction Is Pro-Competitive In An Already Fiercely Competitive Industry. 64

2. The Transaction Will Reduce Fixed Costs Through Vertical Integration. 65

3. The Transaction's Output-Enhancing Synergies Are Strong And "Merger Specific." 66

4. The Transaction Will Result In Significant Cost-Saving Efficiencies. 68

5. The Transaction's Synergies Have Been Validated By A Third Party. 69

6. Complaint Counsel's Efficiencies Analysis Does Not Refute The Substantial Synergies To Be Realized From the Transaction. 70

E. Tronox Faces Intense And Growing Competition From Chinese Producers 71

TABLE OF AUTHORITIES

Page(s)

Cases

In re B.F. Goodrich Co.,
No. 9159, 110 F.T.C. 207, 1988 WL 1025464 (FTC Mar. 15, 1988), *modified by* 1989 WL 1126669 (F.T.C. Apr. 5, 1989) 57

Brown Shoe Co. v. United States,
370 U.S. 294 (1962).....46

In re Chicago Bridge & Iron Co., et al.,
No. 9300, 138 F.T.C. 1024, 2004 WL 5662266 (FTC Dec. 22, 2004).....30

FTC v. Arch Coal, Inc.,
329 F. Supp. 2d 109 (D.D.C. 2004).....46

FTC v. Cardinal Health, Inc.,
12 F. Supp. 2d 34 (D.D.C. 1998).....45

FTC v. CCC Holdings Inc.,
605 F. Supp. 2d 26 (D.D.C. 2009).....46, 60

FTC v. H.J. Heinz Co.,
246 F.3d 708 (D.C. Cir. 2001).....30, 31

FTC v. Staples, Inc.,
970 F. Supp. 1066 (D.D.C. 1997).....30

FTC v. Sysco Corp.,
113 F. Supp. 3d 1 (D.D.C. 2015).....46, 52

In re Polypore Int'l, Inc.,
No. 9327, 149 F.T.C. 486, 2010 WL 9434806 (FTC Mar. 1, 2010), *adopted as modified by* 2010 WL 5132519 (FTC Dec. 13, 2010) 29, 30, 45

In re Titanium Dioxide Antitrust Litigation,
959 F. Supp. 2d 799 (D. Md. 2013).....60

United States v. Baker Hughes,
908 F.2d 981 (D.C. Cir. 1990).....30, 52, 57

United States v. Falstaff Brewing Corp.,
410 U.S. 526 (1973).....71

United States v. Gen. Dynamics, Corp.,
415 U.S. 486 (1974).....29

United States v. H&R Block, Inc.,
833 F. Supp. 2d 36 (D.D.C. 2011) 30

United States v. Oracle Corp.,
331 F. Supp. 2d 1098 (N.D. Cal. 2004) 57

United States v. Sungard Data Sys., Inc.,
172 F. Supp. 2d 172 (D.D.C. 2001) 29

Valspar Corp. v. E.I. Du Pont De Nemours & Co.,
873 F.3d 185 (3d Cir. 2017) 60, 61

Valspar Corp. v. E.I. Du Pont De Nemours,
152 F. Supp. 3d 234 (D. Del. 2016), *aff'd*, 873 F.3d 185 61

Statutes

15 U.S.C. § 18 ..... 27, 29

15 U.S.C. § 18a 27

15 U.S.C. § 45 29

Rules

16 C.F.R. 3.31(b) 31

INTRODUCTION

Having initiated this action to prevent Tronox Limited ("Tronox") from acquiring The National Titanium Dioxide Company ("Cristal") (together, "Respondents"), Complaint Counsel now bears the burden of proving that the transaction is anticompetitive and likely to harm consumers. But after many months of discovery and over a month of trial testimony, Complaint Counsel has entirely failed to carry this burden. Complaint Counsel's evidence suffers from severe defects — selectivity, incompleteness, and unreliability. Complaint Counsel's proposed relevant market is flawed both as a matter of geography (Complaint Counsel artificially limits the market to "North America," restricted to only Canada and the United States despite vigorous global competition) and as a matter of product (Complaint Counsel excludes sulfate-produced TiO2 despite ample evidence that sulfate-produced TiO2 competes directly with chloride-produced TiO2). Complaint Counsel's theories of post-transaction unilateral and coordinated output reduction fare no better: Complaint Counsel relies on inherently flawed economic modeling that assumes its conclusions and fails validity tests that even Complaint Counsel's economic expert concedes are critical to establish the validity of the modeling. Moreover, Respondents have provided detailed, verifiable evidence about transaction-specific synergies, and Complaint Counsel's efficiencies expert is not even qualified to meaningfully assess Respondents' efficiencies.

Complaint Counsel relies on selective, incomplete, and unreliable evidence. Even though Complaint Counsel forced nearly forty titanium dioxide ("TiO2") consumers to participate in the investigative phase of this matter, Complaint Counsel chose to call only five customers to testify at trial, four of them from the same industry. After hearing those customers testify, it is apparent that Complaint Counsel cherry-picked pool of customers who do not even being to represent the breadth of customer views about the purchase and use of TiO2. Even worse, Complaint Counsel

aoffered Paul Malichky from the paint and coatings company PPG, to allegedly provide the only "direct evidence" of Tronox's alleged intention to raise TiO2 prices post-transaction. Mr. Malichky's testimony, however, was evasive, incomplete, and ultimately misleading. His testimony cannot be credited. Complaint Counsel further relies on the expert testimony of Dr. Nicholas Hill, an expert in economics, but Dr. Hill's testimony was unreliable. Dr. Hill lacks experience as an economic expert and is likely to be biased in favor of the government's case; his "Capacity Closure Model" has never been peer reviewed or accepted by other courts; his economic projections evidence numerous flaws, including assuming their conclusions and failing necessary validity tests; and Dr. Hill's own work reveals his calculations to be highly volatile, responding with extreme sensitivity to even minor corrections.

Complaint Counsel has failed to prove a proposed relevant market. Complaint Counsel has failed to prove its proposed relevant market, both as a matter of geography and product. Complaint Counsel's proposed geographic market is artificially limited to "North America," by which Complaint Counsel means only Canada and the United States. But real-world facts do not bear out that gerrymandered definition, however, and the econometric tests on which Complaint Counsel relies are inherently biased to produce the outcome Complaint Counsel prefers. Likewise, Complaint Counsel has not proven its proposed product market. Complaint Counsel has ignored real-world evidence that chloride- and sulfate-process TiO2 compete in the same market and are interchangeable in the vast majority of applications. Having failed to prove either element of its proposed relevant market, Complaint Counsel cannot show that the transaction will increase concentration in the TiO2 industry in a legally significant way.

Complaint Counsel has failed to prove that unilateral or coordinated output reduction is likely post-transaction. Complaint Counsel has also asserted that both unilateral and coordinated

output reduction is likely post-transaction, but here again, Complaint Counsel's evidence cannot satisfy its burden. Complaint Counsel relies on Dr. Hill's flawed economic modeling to predict that the combined company will benefit from reducing its production of TiO2, but analysis that *accurately* accounts for real-world events shows that just the opposite is true: The combined company could not profit from unilateral output reduction. This pattern is repeated for Complaint Counsel's academic economic theories of post-transaction coordinated effects — the real-world facts simply do not agree. Complaint Counsel's academic theories of output reduction (both unilateral and coordinated) also fail critical validity tests and once again do not explain observable, real-world events. Theories that cannot even explain the world we currently live in cannot possibly provide reliable predictions of future events.

Complaint Counsel's efficiencies expert lacks the expertise to refute Respondents' verifiable, transaction-specific synergies. At the same time, Respondents have put forward detailed evidence showing that the Tronox-Cristal transaction will result in verifiable, transaction-specific synergies. Because TiO2 pigment plants and feedstock-producing facilities are complicated, it takes a great deal of expertise to run them. Here, this transaction will allow the combined company to leverage its technical expertise to expand output and lower costs. In an effort to rebut this evidence, Complaint Counsel has offered only the testimony of Dr. Mark E. Zmijewski, an expert in accounting, economics, and finance. Yet even Dr. Zmijewski admits that he has no background or expertise in the TiO2 industry. Cross-examination confirmed, moreover, that he did not understand even basic facts about this industry. Dr. Zmijewski's *inexpert* testimony is categorically insufficient to cast doubt on the real-world expertise Respondents have offered in support of their transaction-specific synergies.

In short, Complaint Counsel has not shown that the Tronox-Cristal transaction will harm TiO2 customers for a simple reason: The transaction is fundamentally pro-competitive and pro-consumer. The combined company will realize significant cost-saving efficiencies and will expand output, to the benefit of TiO2 consumers. Complaint Counsel cannot adduce evidence to the contrary because such evidence simply does not exist. The Court should dismiss Complaint Counsel's complaint and allow Tronox and Cristal to complete their transaction, to the benefit of TiO2 consumers.

BACKGROUND

A. Titanium Dioxide (TiO2)

Rutile titanium dioxide ("TiO2")[1] is an inorganic white pigment essential for manufacturing a wide variety of consumer products. FOF ¶¶ 43, 65 (RX0171). TiO2 is an inert chemical. It has no expiration date, a virtually infinite shelf life, and presents no safety risks during storage and transport. FOF ¶ 283 (Mei, Tr. 3157-58).

Approximately 60% of TiO2 is used in coatings applications, 25% in plastics, 10% in paper, and 5% in other uses, including inks and pharmaceuticals. FOF ¶ 45 (Mouland, Tr. 1211). Generally speaking, TiO2 is known for imparting whiteness, brightness, opacity, and exceptional durability to consumer products. FOF ¶ 42 (RX0171). In coatings specifically, TiO2 "provides functional characteristics such as opacity, whiteness, brightness, hiding power, and durability." FOF ¶ 44 (RX0171). In plastics, TiO2 "is used to aid in the consistency of color quality." FOF

[1] About ten percent of the world's total TiO2 production is anatase TiO2, which has a different crystal structure than rutile TiO2. Anatase TiO2 is used in indoor paints, paper, ceramics, rubber, and fiber manufacture FOF ¶ 453 FN 44 (Christian, Tr. 781-782). Anatase TiO2 is not at issue here. Cristal manufactures anatase TiO2 while Tronox does not.

¶ 44 (RX0171). In paper applications, TiO2 "add[s] brightness, opacity, and printing consistency." FOF ¶ 44.

All TiO2 manufacturing processes depend on "feedstock" as a critical input. Feedstock refers to "TiO2-containing mineral sands products." FOF ¶ 55 (Turgeon, Tr. 2480-81; RX0171). These mineral sands originate as material mined from the Earth in surface mines ranging from 20-60 meters deep. FOF ¶ 56 (Turgeon, Tr. 2585-88). Different types of feedstocks contain different concentrations of titanium, some of which can be directly used to make TiO2 pigment and others of which require "upgrading" into more highly-concentrated types of feedstock before being used to make TiO2 pigment. FOF ¶¶ 59, 60 (Turgeon, Tr. 2589-90, 2595-96). One upgrading process is called "smelting." FOF ¶ 61 (Turgeon, Tr. 2596-97). During the smelting process, naturally-occurring "ilmenite" (a mineral sand that contains a relatively low concentration of titanium dioxide) is melted at high temperatures in a furnace with anthracite, which separates naturally-occurring iron from the desired titanium dioxide. FOF ¶ 61 (Turgeon, Tr. 2596-97). The resulting product is called "slag" and can be fed directly into TiO2 pigment plants. FOF ¶ 61 (Turgeon, Tr. 2596-97). Another upgrading process converts ilmenite into "synthetic rutile" by rusting away naturally-occurring iron in a kiln. FOF ¶ 63 (Turgeon, Tr. 2598-99). Some mineral sands are easier to convert to feedstock by smelting while others are more suitable to processing in a synthetic rutile kiln. FOF ¶ 63 (Turgeon, Tr. 2598-99).

Using feedstock, producers can manufacture TiO2 pigment using either the chloride process or the sulfate process. FOF ¶ 47 (RX0171.0020; Turgeon, Tr. 2605-06). The chloride process requires continuous operation once it is initiated and relies on chlorine gas to purify feedstock into TiO2. FOF ¶ 48 (Turgeon, Tr. 2613-17). The sulfate process combines feedstock with sulfuric acid in batches to create TiO2. FOF ¶ 49 (Turgeon, Tr. 2613, 2617). A molecule of

TiO2 has the same chemical formula and the same molecular structure regardless of whether it is produced using the chloride or sulfate process. FOF ¶ 51 (Turgeon, Tr. 2615; Malichky, Tr. 338-40).

Once either the chloride or sulfate process has been used to create a molecule of TiO2, producers next differentiate their products by "finishing" the TiO2 pigment into different "grades." FOF ¶ 52 (Turgeon, Tr. 2614, 2620-23). These "finishing" processes are the same regardless of whether the TiO2 was produced using the chloride or the sulfate process. FOF ¶¶ 52, 381 (Turgeon, Tr. 2614, 2620-23; Engle, Tr. 2433). The finishing process affects the quality of a final grade of TiO2 pigment more than the manufacturing process (chloride or sulfate). FOF ¶ 381 (Engle, Tr. 2433). For example, a finishing process called "milling" affects the opacity of a TiO2 grade because it determines the particle size of the finished product, which affects optical efficiency. FOF ¶ 382 (Engle, Tr. 2453-54). A finishing process called "surface treatment" also affects opacity because it determines particle dispersion, and it is the primary factor determining a TiO2 grade's durability. FOF ¶ 382 (Engle, Tr. 2453-54, 2477-78). Some finishing techniques so significantly change the performance of TiO2 pigment that, in fact, they can reduce the amount of TiO2 required in a particular end use by as much as 20%. FOF ¶ 382 (Engle, Tr. 2453-54).

B. The TiO2 Industry

The TiO2 industry is part of the broader "chemical industry." FOF ¶ 65 (RX0171). TiO2 is produced and sold all over the world. FOF ¶ 64 (Turgeon, Tr. 2660). Global TiO2 production capacity is approximately 7 million metric tons. FOF ¶¶ 66, 67 (RX0171).

The TiO2 industry "is part of a value chain that starts with the mining of the ore used to produce TiO2 pigment and continues through the product end user." FOF ¶ 71 (Stern, Tr. 3705-06). A "value chain" is "a set of operations or processes or activities that follow each other sequentially in order to transform a raw material—… a feedstock—into a building block[,] which

then gets transformed into a chemical intermediate and finally into an end product." FOF ¶ 71 (Stern, Tr. 3706). Like the chemical industry in general, the TiO2 industry is highly capital-intensive. FOF ¶ 572 (Stern, Tr. 3712). TiO2 plants are large and expensive to build, and producers are incentivized to run plants hard in order to lower fixed costs. FOF ¶¶ 572, 573, 574 (Stern, Tr. 3712; Quinn, Tr. 2321; Duvekot, Tr. 1342). In the TiO2 industry, like the mining industry, "everybody wants to run their mine or their pigment plant at full capacity, because that's the most economical way to run them." FOF ¶ 573 (Turgeon, Tr. 2636-37). Doing so takes "the same fixed costs and spreads that out over a broader production volume," leading to lower costs. FOF ¶¶ 574, 580 (Quinn, Tr. 2321; Christian, Tr. 864).

Additionally, producers in the TiO2 industry cannot easily reduce and restart production. Restarting a TiO2 plant after an outage is not "as easy as flipping a switch." FOF ¶¶ 578, 585 (Stern, Tr. 3751; Christian, Tr. 866-67). Once a production line has been idled, the corrosiveness of the plant environment requires significant maintenance and capital costs that can include relining a "chlorinator" (in a chloride-process setting); a chlorinator combines feedstock with chlorine gas at high temperatures to purify the material that will become TiO2 pigment. FOF ¶ 579 (Turgeon, Tr. 2651-52). In order to restart production, the plant must also be at a certain temperature and a certain amount of material must be "flowing" in the system, and if obstructions have formed, it may be necessary to clear them with jackhammers. FOF ¶ 578 (Stern, Tr. 3751). Likewise, reducing or idling production at a TiO2 plant creates costs, including opportunity costs (because resources are expended to restart production when those resources could be put to other productive uses), and dislocation costs involving technology, workers, and facilities. FOF ¶ 581 (Christian, Tr. 864). As a result, those in the industry agree that well-run TiO2 plants run at full capacity, good economic reasons support running plants full-out (i.e., at full capacity), and it is

unwise to curtail production at TiO2 facilities during ordinary circumstances. FOF ¶¶ 582, 583, 584 (Christian, Tr. 862-66, 869). In short, in the TiO2 industry, "[i]f there's a market to sell the product, you want to run full-out and sell everything that you make." FOF ¶ 584 (Christian, Tr. 866).

Like the broader chemical industry, some TiO2 producers are "vertically integrated," which refers to the "integrated nature of … upstream, midstream, and downstream activities" within the same value chain. FOF ¶ 72 (Stern, Tr. 3708). In other words, some companies prefer to control the entire process necessary to produce TiO2—and with good reason. Vertical integration reduces production costs, including, for example, the "margin" that would otherwise have to be paid to a mine owner to obtain feedstock or the "margin" that would otherwise have to be paid to a feedstock producer to upgrade feedstock. FOF ¶ 117 (Shehadeh, Tr. 3420-21). Accordingly, vertical integration is a key way of lowering costs in the TiO2 industry.

Demand for finished TiO2 pigment drives the entire TiO2 value chain because TiO2 is valuable only when it is finished. FOF ¶ 71 (Stern, Tr. 3708). Demand for TiO2 pigment is influenced by many factors, including price, the intensity of competition among purchasers, and the number of purchasers competing for product. FOF ¶ 90 (Stern, Tr. 3709). TiO2 demand—and the growth rate of that demand—is also closely tied to overall gross domestic product ("GDP") because TiO2 is a "lifestyle" product that improves quality of life for consumers but is not necessary to sustain life. The upshot is that when GDP grows, consumers have more disposable income and demand for TiO2 grows, too. FOF ¶ 90 (Stern, Tr. 3709). When demand is weak, however, TiO2 producers cannot sell all of the TiO2 pigment they produce, and the product builds up as inventory. FOF ¶ 559 (Stern, Tr. 3747). Excess inventory ties up working capital, meaning

that TiO2 producers have expended capital to produce product that earns no income to continue funding the ongoing production process. FOF ¶ 567 (Stern, Tr. 3747).

The TiO2 industry is "a notoriously cyclical business," as are many other chemical-industry businesses. FOF ¶ 86 (Stern, Tr. 3735; Romano, Tr. 2217; Christian, Tr. 881). "The balance between supply and demand is one of the key reasons why the chemical industry in general and the TiO2 business in particular exhibit cyclical performance." FOF ¶ 87 (Stern, Tr. 3735-36). TiO2 price cycles are driven by supply and demand, capacity utilization, and inventory levels. FOF ¶ 87 (Romano, Tr. 2224-25). With regard to supply and demand, price cycles are affected by the mismatch between the demand curve for a product (which tends to be predictable, slopes upwards, and follows GDP) and the supply curve for the same product (which moves in steps, with supply expanding in abrupt increments as new, world-scale plants begin production). FOF ¶ 89 (Stern, Tr. 3736-37).

TiO2 price cycles, moreover, move globally. FOF ¶ 88 (Romano, Tr. 2224-25). While prices may sometimes lead and lag one another in different regions of the world, "there is no point in time where … pricing in one region [will be] moving up and in another region moving down" in a sustained way. FOF ¶ 88 (Romano, Tr. 2224-25). There is no specific timeline for how long TiO2 price cycles last. FOF ¶ 96 (Romano, Tr. 2224-25). They most often last three to five years, but can sometimes be as long as six years. FOF ¶ 96 (Romano, Tr. 2224-25). One recent *down*-cycle in the TiO2 industry lasted four years, from 2012 through the beginning of 2016. FOF ¶ 97 (Turgeon, Tr. 2637).

In the TiO2 industry, pigment producers generally negotiate prices individually with customers. For example, Tronox negotiates *every* price individually with each customer it serves. FOF ¶¶ 73 (Mouland, Tr. 1247; Romano, Tr. 2227.). [redacted]

[redacted] Tronox relies on its "Total Value Proposition" to distinguish itself from competitors and earn a higher price in the market. FOF ¶ 75 (Mouland, Tr. 1204-05). The Total Value Proposition refers to the consistency of Tronox's product, the quality of its product, its pricing, terms, and the technical collaboration offered to customers (including research and development services). FOF ¶ 75 (Mouland, Tr. 1204-05).

While Tronox periodically announces price increases to its customers, these announcements are merely the starting point for negotiations. FOF ¶ 76 (Romano, Tr. 2230). Tronox does not always receive the full amount of an announced price increase. Indeed, it often does not. This is so because negotiations are always affected by competitive factors, including the TiO2 industry's supply-demand cycle, competitive pressures from other TiO2 producers, and the customer's size. FOF ¶ 76 (Romano, Tr. 2256-57). Importantly, Tronox does not implement a "regional price." FOF ¶ 78 (Mouland, Tr. 1252-53). When Tronox uses the term "regional pricing," it simply refers to the average of all customers within the geographic area that Tronox deems to be a region. FOF ¶ 78 (Mouland, Tr. 1252-53).

In North America, TiO2 customers typically have supply contracts with TiO2 suppliers. FOF ¶ 82 (Stern, Tr. 3728; Malichky, Tr. 372-73). These supply contracts often include price protections for the customer, a phenomenon mostly seen in North America. FOF ¶ 82 (Stern, Tr. 3729; Malichky, Tr. 372-73). Generally, a customer with such a price protection is insulated from any announced price increases for a set period of time, usually 90 days. FOF ¶ 82 (Stern, Tr. 3728-29; Malichky, Tr. 372-73 (PPG has 90 days in Europe and 120 in the U.S.); Young, Tr. 687

(Sherwin Williams has 180 days)). This causes prices in North America to be "stickier" than in the rest of the world, which means that when global prices go up or down, prices in North America lag behind. FOF ¶ 82 (Stern, Tr. 3732).

C. The Merging Parties

1. Tronox, Limited

Tronox, Limited ("Tronox") is a company publicly traded on the New York Stock Exchange (TRX). FOF ¶ 1. Tronox's corporate headquarters are located in Stamford, Connecticut, and the company is registered to do business under the laws of Australia. FOF ¶ 1. Tronox produces TiO2 facilities in Hamilton (Mississippi), Kwinana (Australia), and Botlek (the Netherlands). FOF ¶ 277(b) (Romano, Tr. 2231). Tronox mines feedstock in South Africa and Australia. FOF ¶ 277(a) (Mei, Tr. 3150-51). Tronox has a research facility located in Oklahoma, City, Oklahoma. FOF ¶ 2 (Engle, Tr. 3149-51).

2. Cristal

The National Titanium Dioxide Company Ltd. ("Cristal"), is a privately held company registered under the laws of the Kingdom of Saudi Arabia. FOF ¶ 9 (RX0171). The National Industrialization Company ("TASNEE") is a joint stock company registered under the laws of the Kingdom of Saudi Arabia. TASNEE owns 79% of Cristal. FOF ¶ 9 (Stoll, Tr. 2063; PX0001). Cristal USA, Inc. is an indirectly owned subsidiary of Cristal. FOF ¶ 9 (JX0001). Cristal subsidiaries operate TiO2 pigment manufacturing facilities on five continents: Ashtabula I (Ohio), Ashtabula II (Ohio), Yanbu (Saudi Arabia), Stallingborough (United Kingdom), Bunbury (Australia), Bahia (Brazil), Tikon (China), and Thann (France). Cristal mines feedstock in Brazil and Australia. FOF ¶ 10 (JX0001). Cristal has a research facility near Baltimore, Maryland. FOF ¶ 9 (JX0001).

D. Competing TiO2 Suppliers

The six largest TiO2 producers in the world are commonly referred to as the "global producers." FOF ¶ 70 (RX0171). Each has proprietary chloride technology. FOF ¶ 70 (RX0171). Some global producers have only chloride plants while others have a mix of chloride and sulfate plants. FOF ¶ 70 (RX0171). Together, these six producers comprise 60% of the world's TiO2 production. FOF ¶ 69 (RX0171). Specifically, TiO2 production is divided among producers as follows: Chemours (15%), Cristal (11%), Venator (11%), Lomon Billions (8%), Kronos (8%), Tronox (7%), Others (40%). FOF ¶ 69 (RX0171).

Chemours is the world's largest TiO2 producer and is the "800 pound gorilla" in the TiO2 industry. FOF ¶ 23 (Quinn, Tr. 2344-45; PX0010). Chemours "has large-scale assets," "large-scale technology … that allows them to use a variety of feedstocks including lower quality feedstocks," and, critically, a "low-cost position." FOF ¶ 23 (Quinn, Tr. 2344-45; PX0010; Stern, Tr. 3784-85; RX0171). Chemours' low-cost position and proprietary technology differentiate Chemours from other TiO2 producers. FOF ¶ 466 (Mouland, Tr. 1206-07). Chemours produces only chloride-process TiO2. FOF ¶ 466 (Mouland, Tr. 1207).

Lomon Billions is a Chinese TiO2 producer and a relatively new entrant to the industry, although it is already the fourth-largest TiO2 producer in the world. FOF ¶ 69 (RX0171). It is larger than Tronox, with a production capacity of [redacted] of TiO2 pigment (by contrast, Tronox's current global capacity is [redacted]). FOF ¶¶ 25, 68, 69, 487 (RX0171; Turgeon, Tr. 2659-60; Romano, Tr. 2243-44; Engle, Tr. 2491-93). [redacted]

Lomon Billions produces both chloride-process and sulfate-process TiO2. FOF ¶ 467 (Malichky, Tr. 316; Stern, Tr. 3783). It is widely recognized as one of the lowest-cost producers in the TiO2 industry. FOF ¶ 468 (Engle, Tr. 2493-94; Stern, Tr. 3783). [redacted]

[redacted]

Lomon Billions has announced plans to expand its chloride capacity by building an additional 200,000 tons of production capacity during 2019. FOF ¶ 473 (Engle, Tr. 2498-99; Stern, Tr. 3781). The company's current chloride plant has 100,000 tons of capacity and is operating at about 70,000 tons per year. FOF ¶ 473 (Mouland, Tr. 1243; Stern, Tr. 3781).

Venator Materials Corporation ("Venator") is one of the world's three largest TiO2 producers, and it produces both chloride- and sulfate-process TiO2. FOF ¶ 474 (Mouland, Tr. 1208). Venator competes everywhere in the world. FOF ¶ 474 (Mouland, Tr. 1208). Venator was formerly known as Huntsman Corporation ("Huntsman") before being spun-off to create a standalone TiO2 company. FOF ¶ 67 (d) (RX0171).

Kronos is another global-scale competitor and is larger than Tronox. FOF ¶¶ 69, 475 (RX0171; Mouland, Tr. 1208). Kronos manufactures both chloride- and sulfate-process TiO2 and competes everywhere in the world. FOF ¶ 475 (Christian, Tr. 859; Mouland, Tr. 1208). Kronos manufactures about 40 grades of TiO2, about half of which are sulfate-process grades and half of which are chloride-process grades. FOF ¶ 409 (Christian, Tr. 897-98).

In addition to these global-scale competitors, Tronox competes with a number of other Chinese TiO2 producers, primarily in Asia, although these producers are also "branching out" to make their competitive reach more global in nature. FOF ¶ 476 (Mouland, Tr. 1210). Tronox competes with a number of intermediate-size competitors around the world, too, including

intermediate-sized competitors in Eastern Europe, India (Kerala Minerals), and Japan (Ishihara). FOF ¶ 476 (Mouland, Tr. 1210).

E. TiO2 Customers

Customers "have a lot of power" in the TiO2 industry. FOF ¶ 530 (Christian, Tr. 878). Many TiO2 customers are large, multinational companies that engage in complex and strategic decisions when procuring TiO2. FOF ¶ 530 (Christian, Tr. 878-79, 886). [redacted]

TiO2 is an essential input in a variety of industries, including paints and coatings, plastics, paper, inks, and pharmaceuticals. Of these, the paints and coatings industry is the largest consumer of TiO2, accounting for about 60% of all TiO2 purchases. FOF ¶ 45 (Mouland, Tr. 1211). The paints and coatings industry has undergone significant consolidation in recent years. FOF ¶ 534 (Stern, Tr. 3847). For example, as recently as 2017, Sherwin Williams, a large multinational paint and coatings company, acquired Valspar, another large multinational paint and coatings company, making Valspar a key brand of Sherwin Williams. FOF ¶ 535 (Young, Tr. 631). [redacted] As a result of this consolidation, the top ten global suppliers of paints and coatings represent more than 50 percent of the global market. FOF ¶ 534 (Stern, Tr. 3847-48). This consolidation confers

greater buying power on TiO2 customers in the paint and coatings industry as compared to the relative power of TiO2 suppliers, like Tronox and Cristal. FOF ¶ 534 (Stern, Tr. 3847-48).

For example, one very large TiO2 customer is PPG Industries ("PPG"), one of the largest paint and coatings companies in the world. FOF ¶ 536 (Malichky, Tr. 267-69; 343). [redacted] By comparison, Tronox's annual global sales are approximately $1.49 billion. FOF ¶ 536 (PX9053-12). In the United States, PPG sells architectural paint under the brand names Glidden, Pittsburgh Paint, Manor Hall, Liquid Nails, and others. FOF ¶ (Malichky, Tr. 269). PPG also sells paint for industrial applications, like painting bridges or cars or airplanes. FOF ¶ (Malichky, Tr. 26970). As a large-scale, global purchaser of TiO2, PPG exerts significant influence over price and purchasing negotiations when contracting to buy TiO2 from producers like Tronox. [redacted]

PPG also takes advantage of arbitrage opportunities in order to secure the best price for its TiO2. [redacted]

[redacted]

Sherwin Williams Company ("Sherwin Williams") is another global paint and coatings company and a key customer purchasing large quantities of TiO2. Sherwin Williams produces architectural (consumer) paints as well as industrial coatings, used for automobiles, marine uses, coils, and other industrial applications. FOF ¶ 537 (Young, Tr. 631). Sherwin Williams' primary brand carries the company's own name. FOF ¶ 537 (Young, Tr. 631). Other key Sherwin-Williams brands include recently-acquired Valspar as well as Dutch Boy and Cabot. FOF ¶ 537 (Young, Tr. 631). Sherwin Williams sells its products globally, in the Americas, Europe, Asia, Australia, South Africa, and India, and it manufacturers its products in all of the same locations, except India. FOF ¶ 537 (Young, Tr. 632). In North America, Sherwin Williams is the largest producer of coatings. FOF ¶ 537 (Young Tr. 633).

Masco Coatings Corporation ("Masco") is another a large-scale TiO2 customer in the paints and coatings industry. Masco produces paint for architectural coatings, like interior and exterior house paint. FOF ¶ 538 (Pschaidt, Tr. 963). Masco sells its paint under the brand names "Behr" and "Kilz." FOF ¶ 538 (Pschaidt, Tr. 966). [redacted]

[redacted]

True Value is another key customer of TiO2 producers like Tronox and Cristal. True Value is a hardware co-op business that includes a vertically-integrated paint business, meaning that True Value both manufactures paint and sells that paint through its hardware co-op stores. FOF ¶ 539 (Vanderpool, Tr. 157). True Value sells its paint at 2000 stores in the United States. FOF ¶ 539 (Vanderpool, Tr. 180). True Value also manufactures some paint for other companies. FOF ¶ 539 (Vanderpool, Tr. 185). True Value relies on a global sourcing team to track the availability of the raw materials True Value needs to purchase. FOF ¶ 539 (Vanderpool, Tr. 222). [redacted]

F. Tronox History

a. Bankruptcy

The period from 2008 until 2009 was particularly difficult for Tronox and its competitors. FOF ¶¶ 544, 545, 587 (Stern, Tr. 3742; PX7006; PX6047; Christian, Tr. 866). In 2008, a global credit crisis and a drop in TiO2 demand dramatically affected Tronox's operations, requiring production reductions in order to avoid holding large volumes of product in inventory. FOF ¶ 544 (Duvekot, Tr. 1342). In January 2009, Tronox entered Chapter 11 bankruptcy. FOF ¶ 544 (Stern, Tr. 3742-43). Later that year, Tronox was forced to close its plant in Savannah, Georgia, because

that plant was unable to run within its own cash flow. FOF ¶ 544 (Romano, Tr. 2249). Tronox emerged from bankruptcy in February 2011. FOF ¶ 8 (RX0171).

b. Price Cycles and Production Reductions

After emerging from bankruptcy in 2011, Tronox continued to confront price cycles in the TiO2 market, including market downturns that threatened to return the company to bankruptcy. For example, from 2011 to 2012, Tronox's total sales profile dropped 21% year over year. FOF ¶ 547 (Romano, Tr. 2250-51). In some regions, sales numbers were even more devastating: during the fourth quarter of 2011, sales dropped a massive 43% in the Asia Pacific region. FOF ¶ 547 (Romano, Tr. 2250-51). During this time, some large TiO2 customers had over twelve months of inventory already on hand, and customers were essentially unwilling to purchase at any price. FOF ¶ 547 (Romano, Tr. 2250-51). Rather than continue to build (and tie up cash in) unsellable inventory, Tronox temporarily reduced its TiO2 output in 2012. FOF ¶ 547 (Romano, Tr. 2250-51).

Despite production reductions, TiO2 prices continued to decrease for the following four years in what would prove to be a long period of downturn in the TiO2 industry. FOF ¶¶ 549, 550, 551 (Romano, Tr. 2250-51; Turgeon, Tr. 2637). In 2015, when this prolonged downturn had already been ongoing for several years, Tronox reached another crisis point. Tronox was running its assets at cost, yet demand had collapsed, and Tronox had an oversupply of TiO2 pigment on hand. FOF ¶ 551 (Turgeon, Tr. 2637). Close to $1 billion was tied up in Tronox's inventory at that time, which was simply untenable for the business. FOF ¶ 551 (Turgeon, Tr. 2637). Tronox was forced again to reduce its TiO2 output temporarily in response to these dire conditions. FOF ¶¶ 550, 554 (Turgeon, Tr. 2637; Romano, Tr. 2250-52). Due to high inventory levels, Tronox did not experience unmet customer demand even while it was reducing output. FOF ¶¶ 552, 562 (Stern, Tr. 3756-57; Arndt, Tr. 1402-04; Turgeon, Tr. 2649-50). TiO2 prices also continued to

decline into 2016 because supply (even at reduced output levels) continued to outstrip demand. FOF ¶¶ 553, 563 (Arndt, Tr. 1399-1402; Stern, Tr. 3771; Turgeon, Tr. 2652-53). If Tronox had continued to produce TiO2 at normal levels during this time, it would have risked returning to bankruptcy. FOF ¶ 557 (Turgeon, Tr. 2638).

As soon as inventory levels returning to normal, Tronox restarted its idled pigment lines and returned to full production capacity, even though global TiO2 prices were still falling. FOF ¶ 563 (Turgeon, Tr. 2652-53). Tronox's plan had always been to idle facilities only long enough to reduce inventory, which is exactly what it did. FOF ¶ 563 (Turgeon, Tr. 2652-53).[2] By selling product from inventory during the reductions and restarting regular production when inventory levels returned to normal, Tronox never lost any customer sales due to reduced production. FOF ¶ 562 (Turgeon, Tr. 2649-50).

Following the 2015 production reductions, Tronox has run its pigment plants and smelting facilities at full production. FOF ¶ 564 (Turgeon, Tr. 2652).

c. Negative Consequences for Tronox Despite Production Reductions

Tronox faced serious financial consequences in 2015 as a result of temporarily idling its TiO2 production in response to the severe market downturn. FOF ¶ 566 (Arndt, Tr. 1403). Beginning with the second quarter of 2015 and continuing for four consecutive quarters through the first quarter of 2016, Tronox operated at a loss. FOF ¶ 568 (Stern, Tr. 3768). During the fourth

[2] Tronox did not rely solely on production reductions to alleviate the intense financial pressures the company faced during this prolonged downcycle. At this time, Tronox underwent a restructuring project called "Project Rising Star." FOF ¶ 569(b) (Turgeon, Tr. 2641-43). During this restructuring, Tronox made changes to its business to lower its cost position and put the company in a better position to survive this and future downcycles. FOF ¶ 569(b) (Turgeon, Tr. 2641-43). Tronox also developed the "Tronox Way" during this time period, which is a standardized set of best practices aimed at maximizing output and lowering the company's cost position at every facility that it operates. FOF ¶ 569(c) (Turgeon, Tr. 2655). Applying the Tronox Way as a pilot program at the Hamilton facility reduced the cost-per-ton of TiO2 production at that facility by $200. FOF ¶ 570 (Turgeon, Tr. 2643-45).

quarter of 2015, Moody's downgraded Tronox with a negative outlook due to the company's reduced cash flow, high inventory, and high debt. FOF ¶ 566 (Arndt, Tr. 1403; Stern, Tr. 3751-52; RX1561).

G. Competitive Strategy

[redacted] Today, with its mines and pigment facilities, Tronox is the "[w]orld's largest fully vertically integrated titanium mining to titanium dioxide value chain." FOF ¶ 7 (PX9053). Tronox owns 3 mineral sands mines and 3 TiO2 pigment production facilities. FOF ¶ 7 (PX9053).

As noted above, in the TiO2 industry, like many other chemical industries, [redacted]

H. Deal Rationale

Tronox's acquisition of Cristal presents a unique opportunity to improve the company's vertical integration and reduce costs. Tronox is vertically integrated, but it is "long" on feedstock; this means that Tronox produces more feedstock than is necessary to supply its TiO2 pigment plants. FOF ¶ 113 (Van Niekerk, Tr. 3901-02; Turgeon, Tr. 2601-03). Tronox attempts to sell its excess feedstock, but because purchasers of TiO2 feedstock are also Tronox's competitors in the

TiO2 pigment industry, Tronox cannot always find buyers for its excess feedstock. FOF ¶ 113 (Turgeon, Tr. 2601-03). Tronox is forced to stockpile excess feedstock that it is unable to sell. FOF ¶ 113 (Turgeon, Tr. 2601-03).

By contrast, Cristal is "short" on feedstock. FOF ¶ 114 (Turgeon, Tr. 2604). Cristal does not produce enough feedstock to supply its own pigment plants and must purchase feedstock on the market. FOF ¶ 114 (Stoll, Tr. 2111; Turgeon, Tr. 2604). Purchasing feedstock requires Cristal to pay margin to the feedstock producer, which raises the costs of producing Cristal's TiO2. FOF ¶ 117 (Shehadeh, Tr. 3420-21).

Tronox seeks to acquire Cristal because the transaction presents a rare opportunity to create a combined entity with more balanced vertical integration than either company standing alone. FOF ¶ 114 (Turgeon, Tr. 2603-04; Stern, Tr. 3851; Stoll, Tr. 2111). Tronox's existing excess feedstock capacity can be profitably supplied to run Cristal's TiO2 pigment plants, which will alleviate the need for Cristal to turn to the feedstock markets and pay unnecessary margin on feedstock purchases. FOF ¶¶ 114, 115, 117 (Turgeon, Tr. 2603-04; Stern, Tr. 3851; Stoll, Tr. 2111; Shehadeh, Tr. 3420-21). The combined entity will be slightly short on feedstock overall, but this is a more desirable position because it means Tronox will not be saddled with stockpiles of feedstock that it cannot sell. FOF ¶ 115 (Turgeon, Tr. 2604). In short, the combination between Tronox and Cristal is a "perfect fit." FOF ¶ 116 (Turgeon, Tr. 2604).

I. The Tronox-Cristal Transaction

On November 23, 2016, Tronox and Cristal agreed to a non-binding deal construct and began conducting due diligence. FOF ¶ 14 (PX9035).

On February 21, 2017, Tronox announced an agreement to acquire Cristal's TiO2 business, including its "global pigment operations around the world, plus (Cristal's) mineral sands operations in Australia and in Brazil." FOF ¶ 19 (Quinn, Tr. 2309-10). [redacted]

[redacted] Shareholders approved the transaction on October 2, 2017. FOF ¶ 17 (PX9035-018).

The transaction additionally provided for Tronox and Cristal to ultimately enter an option agreement related to Cristal's feedstock slagger in Jazan, Saudi Arabia. FOF ¶ 204 (Van Niekerk, Tr. 3900-01, 3945-46). This part of the transaction is subject to an option agreement because the Jazan slagger "hadn't worked," but would be "really valuable" if it did work. FOF ¶ 208 (Quinn, Tr. 2311-12). Tronox needed to give its "board comfort that [it] would not buy something that was not operational" and Tronox "did not have enough cash to do an all-cash deal" including the slagger. FOF ¶ 116 (Van Niekerk, Tr. 3945-46). To facilitate the Jazan transaction, Tronox entered into a technical services agreement ("TSA") with Cristal to assist Cristal in getting the Jazan slagger recommissioned. FOF ¶ 211 (Van Niekerk, Tr. 3951). Under the TSA, Tronox began investing substantial financial resources to train Jazan personnel, maintain an onsite presence, consult with Cristal on design issues, and make significant contributions for changes at the facility. FOF ¶ 212 (Quinn, Tr. 2426).

[redacted]

This approach helps bridge the "value gap" that otherwise would have existed between Tronox and Cristal with regard to Jazan; this type of arrangement is not uncommon in significant mergers.

FOF ¶ 210 (Quinn, Tr. 2312-13). Tronox would never have entered these agreements absent the broader transaction, and if the transaction does not proceed, "both the technical services agreement and the option agreement will lapse immediately because they are part and parcel of the bigger Cristal-Tronox deal." FOF ¶¶ 211, 217 (Van Niekerk, Tr. 3960-61).

J. Due Diligence

Tronox has conducted extensive due diligence with regard to the transaction both before and after signing. In doing so, Tronox has developed a detailed analysis for every synergy anticipated as a result of the transaction. FOF ¶ 249 (Quinn, Tr. 2337-38; PX0010). Tronox's synergies analysis was not performed "by a bunch of investment bankers sitting around in their offices in New York," but by "boots on the ground … experienced operating people" who travelled to actual facilities and conducted expertise-driven reviews of assets and projected synergies. FOF ¶ 250 (Quinn, Tr. 2337-38).

For example, Tronox began sending teams of its employees to evaluate Cristal facilities during pre-signing due diligence. FOF ¶ 158 (Dean, Tr. 2970). Mr. Dick Dean, Tronox's vice president of manufacturing operations, visited Cristal's Yanbu facility pre-signing to "ascertain its capabilities." FOF ¶ 158 (Dean, Tr. 2975-76). Dean has extensive experience in running and "turning around TiO2 pigment plants," giving him knowledge rivalled by, at most, ten other people in the entire world. FOF ¶ 159 (Dean, Tr. 2996). Dean's expertise allowed him to set meaningful goals for transforming Yanbu's performance. [redacted]

Dean will also develop the workforce at Yanbu by developing knowledge within the local Saudi Arabian team. FOF ¶ 164 (Dean, Tr. 2985-86). [redacted]

[redacted]

Similarly, Tronox has also conducted extensive due diligence with regard to Cristal's non-operational slagger in Jazan, Saudi Arabia. Tronox began sending teams to evaluate the physical Jazan facility during the pre-signing period. FOF ¶ 201 (Van Niekerk, Tr. 3944-45). Ultimately, the Tronox team visited Jazan three times to conduct due diligence and even participated in a week-long workshop with Outotec, the company that designed Jazan's furnace. FOF ¶ 201 (Van Niekerk, Tr. 3944-45). Tronox requested reports about Jazan from Cristal, which Cristal shared through the data room during the due diligence process. FOF ¶ 201 (Van Niekerk, Tr. 3944-45).

Tronox visited each of Cristal's facilities around the world to conduct similar due diligence investigations—TiO2 plants in Tikon, Bunbury, Yanbu, Thann, Stallingborough, and Ashtabula, as well as both Cristal feedstock mines, one in Australia and one in Brazil as part of the due diligence process. FOF ¶¶ 110, 251 (Mancini, Tr. 2763-64; Quinn, Tr. 2354-55). Tronox formed a "project management office" that created a "very formal process for identifying … synergies, assigning accountability for [them], tracking [them], … and measuring [them]." FOF ¶ 251 (Quinn, Tr. 2339). [redacted] The KPMG team looked at primary source material, even data that company personnel at Tronox and Cristal could not access. FOF ¶ 246 (Mancini 2803). [redacted] KPMG blessed Tronox's analysis of the anticipated post-transaction synergies, with a "strong level of confidence that … Tronox could deliver those

estimated synergies." FOF ¶ 248 (Mancini, Tr. 2801-02). Tronox provided the KPMG report to lenders to support the synergies the company was projecting would result from the transaction.

Ultimately, Tronox publicly communicated to the market that it expected to realize $100 million of EBITDA synergies by the end of year 1, and $200 million by the end of year three. FOF ¶ 106 (Mancini, Tr. 2800). Tronox conveyed these numbers to its board, as well, and described them as a "conservative estimate" that was "risk-adjusted" such that "there might be more upside" than the value estimated. FOF ¶ 106 (Quinn, Tr. 2329, 2341-42). This approach was in keeping with the "natural tendency … to be conservative" when making these kinds of estimates, because the company "want[s] to make sure that the deal makes financial sense." FOF ¶ 106 (Quinn, Tr. 2329, 2341-42).

K. Confirmatory Due Diligence

[redacted]

[redacted] In fact, however, Tronox did much better than that. FOF ¶ 264 (Mancini, Tr. 2747-48). By the end of year one alone, Tronox had realized $32 million in synergies, and by the end of year two, that number had risen to $40 million. FOF ¶ 264 (Mancini, Tr. 2747-48). The Tronox-Cristal transaction presents even more opportunities for significant synergies "because the Cristal business is so similar to the Tronox business that there is a lot more overlap." FOF ¶ 265 (Mancini, Tr. 2748-49).

L. FTC Actions, Expiration Of Long-Stop Date

Since announcing their transaction on February 21, 2017, [redacted]

On March 14, 2017, Tronox and Cristal filed a Premerger Notification and Report Form with the FTC and the Department of Justice pursuant to the Hart-Scott-Rodino Act ("HSR Act"), 15 U.S.C. § 18a. FOF ¶ 33. The filing informed the FTC of the transaction's "drop-dead" expiration date of May 21, 2018, which was more than a year away at that time. FOF ¶ 33 (PX0009). FTC responded by issuing a formal request for additional detailed information on April 13, 2017. FOF ¶ 34 (PX0002). By September 20, 2017, both Tronox and Cristal had substantially completed their responses to the formal request, which included providing over 1.3 million documents comprising more than 4.2 million pages to the FTC, as well as narrative answers and comprehensive analyses. FOF ¶ 36 (PX0002; PX0003).

Tronox and Cristal voluntarily agreed not to close the transaction before December 1, 2017, providing the FTC with six weeks of additional time beyond what the HSR Act allots for the agency to determine whether it should initiate proceedings to block the transaction. FOF ¶ 37 (PX9087). The FTC allowed the extended deadline to pass without acting and without announcement. FOF ¶ 37 (PX9086). On December 5, 2017, two FTC Commissioners voted 2-0 to authorize Complaint Counsel to file an administrative complaint and to seek a temporary

restraining order and preliminary injunction in federal district court to block the Tronox-Cristal transaction. FOF ¶ 38 (RX1399).

Despite having the authority to do so, Complaint Counsel declined to seek injunctive action in federal court, which would have likely resulted in a court decision within a matter of weeks or months. Instead, the FTC lawyers opted to pursue only the administrative complaint before the FTC's Office of Administrative Law Judges pursuant to Part Three of the FTC's rules and regulations. Under the Part Three Rules, the administrative trial was set to begin May 18, 2018, fifteen months after the deal was announced and three days before the drop-dead date. 01/25/2018 First Revised Scheduling Order.

As it became increasingly clear that the transaction would not receive regulatory clearance before the "drop-dead" date in May 2018, Tronox and Cristal negotiated in March 2018 to extend the transaction's end date from May 21, 2018 to June 30, 2018, with automatic three-month extensions until, if necessary, March 31, 2019. FOF ¶ 40 (PX9102). The re-negotiated deal came at a cost: if (1) at any point between January 1, 2019 and March 31, 2019, Tronox decides not to proceed with the transaction due to regulatory uncertainty *or* (2) if the deal expires on March 31, 2019, Tronox will be required to pay Cristal a $60 million break-fee. FOF ¶ 40 (PX9102).

M. Procedural History of Part 3 Proceedings

On December 5, 2017, Complaint Counsel filed an administrative complaint against Tronox and Cristal to initiate this matter. The Commission set a trial date for this matter of May 18, 2018. The parties participated in a scheduling conference before this Court on December 20, 2017, after which discovery commenced between the parties. On May 17, 2018, the Court held a final prehearing conference between the parties, and on May 18, 2018 the Court heard opening statements from both sides and began hearing witness testimony. Testimony continued over the course of the next month, with trial proceedings on the following dates: May 18, 23-25, and 30-

31 and June 1, 6-8, 13-15, and 20-22. This Court closed the record and set out a post-trial briefing schedule on June 27, 2018, under which schedule the parties will file their simultaneous post-trial briefs, proposed findings of fact, and proposed conclusions of law on August 7 and their simultaneous replies on September 10. Closing statements will be held at the conclusion of briefing.

ARGUMENT

Section 7 of the Clayton Act prohibits a corporation from acquiring another where "the effect of such acquisition may be substantially to lessen competition, or to tend to create a monopoly." 15 U.S.C. § 18. When challenging a transaction under the Clayton Act, Complaint Counsel bears the "ultimate burden of proving a Section 7 violation." *United States v. Sungard Data Sys., Inc.*, 172 F. Supp. 2d 172, 180 (D.D.C. 2001).[3]

In keeping with Complaint Counsel's overall burden in Section 7 cases, "Complaint Counsel bears the burden of proving [the] relevant market within which" the transaction is likely to have "anticompetitive effects." *In re Polypore Int'l, Inc.*, No. 9327, 149 F.T.C. 486, 2010 WL 9434806, at *165 (FTC Mar. 1, 2010) (internal citation omitted), *adopted as modified by* 2010 WL 5132519 (FTC Dec. 13, 2010). Determining the relevant market is a critical first step because "only a further examination of the particular market—its structure, history, and probable future—can provide the appropriate setting for judging the probable anticompetitive effects of the merger." *United States v. Gen. Dynamics, Corp.*, 415 U.S. 486, 498 (1974).

[3] Complaint Counsel also challenges the transaction under Section 5 of the FTC Act, which "d[]eclare[s] unlawful[]" "[u]nfair methods of competition in or affecting commerce." 15 U.S.C. § 45. "The allegation that the acquisition is a Section 5 violation, as well as a Section 7 violation, does not require an independent analysis." *In re Polypore Int'l, Inc.*, No. 9327, 149 F.T.C. 486, 2010 WL 9434806, at *164 (FTC Mar. 1, 2010), *adopted as modified by* 2010 WL 5132519 (FTC Dec. 13, 2010) (internal quotation marks omitted).

Once a relevant market is established, Complaint Counsel bears the burden of proving that the effect of the transaction "may be substantially to lessen competition, or to tend to create a monopoly" in that relevant market. *In re Polypore Int'l, Inc.*, 2010 WL 9434806, *165. Complaint Counsel must first establish a prima facie case by showing that the transaction would "produce 'a firm controlling an undue percentage share of the relevant market, and would result in a significant increase in the concentration of firms in that market.'" *FTC v. H.J. Heinz Co.*, 246 F.3d 708, 715 (D.C. Cir. 2001) (alterations omitted).

Second, if Complaint Counsel succeeds in making out a prima facie case, Respondents may "show that the market-share statistics give an inaccurate prediction of the proposed acquisition's probable effect on competition." *FTC v. Staples, Inc.*, 970 F. Supp. 1066, 1083 (D.D.C. 1997). "Respondents are not required to 'clearly' disprove future anticompetitive effects, because such a requirement would impermissibly shift the ultimate burden of persuasion" from Complaint Counsel to Respondents. *In re Chicago Bridge & Iron Co., et al.*, No. 9300, 138 F.T.C. 1024, 2004 WL 5662266, at *158 (FTC Dec. 22, 2004) (quoting *United States v. Baker Hughes*, 908 F.2d 981, 991 (D.C. Cir. 1990)). Instead, Respondents may rely on a variety of factors to undermine Complaint Counsel's statistical prima facie case, including "a showing of sufficient efficiencies" resulting from the transaction, *United States v. H&R Block, Inc.*, 833 F. Supp. 2d 36, 89 (D.D.C. 2011), "the trend of the market either toward or away from concentration, [and] the continuation of active price competition." *In re Chicago Bridge & Iron Co., et al.*, 2004 WL 5662266, at *158.

Third, if Respondents rebut Complaint Counsel's prima facie case of anticompetitive effects, "the burden of producing additional evidence of anticompetitive effect shifts to the

government, and merges with the ultimate burden of persuasion, which remains with the government at all times." *Heinz*, 246 F.3d at 715.

I. COMPLAINT COUNSEL RELIES ON SELECTIVE AND INCOMPLETE EVIDENCE THAT CANNOT BE CREDITED

A. Complaint Counsel Has Selectively Relied On A Small And Unrepresentative Sample of TiO2 Customers

At trial, Complaint Counsel presented testimony from only five customer witnesses despite having initially disclosed that more than three dozen customers were likely to possess information relevant to these proceedings. In doing so, Complaint Counsel self-selected a small and unrepresentative sample of TiO2 customers that does not accurately reflect the industry's customer base as a whole.

In its initial disclosures, Complaint Counsel listed 39 non-parties identified as "TiO2 purchas[ers]" "likely to have discoverable information" on which Complaint Counsel may rely to support its claims. Doc. 9377, Complaint Counsel's Mandatory Initial Disclosures Pursuant to 16 C.F.R. 3.31(b), pp. 1, Appendix A. These 39 non-parties were TiO2 customers spanning every major industry that uses TiO2: paint, coatings, paper, plastics, inks, and pharmaceuticals. *Id*. Many of these customers had already been the subject of Complaint Counsel's extensive civil investigative demands during the investigation process. Complaint Counsel issued these demands in the form of lengthy questionnaires to 23 TiO2 customers, who responded with detailed written responses about their TiO2 purchasing and use.

Even though it has access to this extensive collection of relevant information, Complaint Counsel, without explanation, has chosen to rely on the testimony of only a handful of customers — almost exclusively from the paint and coatings industry — in these proceedings. During discovery, Complaint Counsel offered declarations from only four customers: three from the paint and coatings industry (PPG, Sherwin-Williams, and Masco) and one from the plastics industry

(Mississippi Polymers). At trial, Complaint Counsel called only five customer witnesses: four from the paint and coatings industry (representing PPG, Sherwin-Williams, Masco, and True Value) and one from the plastics industry (representing Deceuninck).

In short, Complaint Counsel built its evidentiary record on the testimony of an artificially small number of TiO2 customers disproportionately representing a single industry. Complaint Counsel has never limited its theory of post-transaction anticompetitive effects to the paint and coatings industry, and yet Complaint Counsel presented testimony from only *one* witness outside that industry. Coatings represent 60% of TiO2 consumption—leaving 40% of TiO2 consumption almost entirely unrepresented and unaddressed in Complaint Counsel's presentation of evidence. FOF ¶ 45 (Mouland, Tr. 1211).

Because the burden of proof at all times rests with Complaint Counsel, Respondents have no responsibility to present customer testimony. Nonetheless, Respondents have amply shown that Complaint Counsel *could* have presented relevant evidence from other TiO2 customers but ignored such evidence when it was inconsistent with Complaint Counsel's artificial theory of the TiO2 market. [redacted]

[redacted] Complaint Counsel's proffered customer testimony represents a sample size too small and too selective to meet Complaint Counsel's burden of showing how this transaction is likely to affect customers in the TiO2 industry *as a whole*.

B. The Testimony of Paul Malichky, Representing PPG, Is Unreliable And Cannot Be Credited.

Complaint Counsel relied on the testimony of Paul Malichky, representing paint and coatings company PPG, to provide the only alleged "direct evidence" in this case that Tronox plans to raise prices after acquiring Cristal, *see* Complaint Counsel Opening Statement, Tr. 13-14, 44-45, but Mr. Malichky's trial testimony was evasive and dishonest and cannot be credited. Mr. Malichky repeatedly refused to answer yes-or-no questions with a yes-or-no response and often revealed on cross-examination that his earlier testimony had omitted critical details and obscured events and their significance. The Court should entirely discredit Mr. Malichky's

testimony as a result, and in particular, the Court should not credit Mr. Malichky's testimony about his meetings, conversations, and negotiations with Tronox about pricing changes after announcing the acquisition of Cristal. Mr. Malichky demonstrated that his original story about those negotiations was misleading, and when challenged by counsel about that story, Mr. Malichky offered testimony that he then contradicted directly. Mr. Malichky's testimony is not reliable and should not be credited.

To begin, Mr. Malichky's repeatedly evidenced his unwillingness to provide fair and accurate testimony to the Court in response to questions from counsel. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

4 [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

6 [redacted]

7 [redacted]

8 [redacted]

[redacted] And when it suited him, Mr. Malichky had trouble remembering the meaning of things he had recently written, even when provided with the relevant document to refresh his recollection. [redacted]

Mr. Malichky also testified at length about conversations and negotiations he had with Tronox employees about PPG's TiO2 prices after the Tronox-Cristal transaction, and the whole of Mr. Malichky's testimony on this matter revealed its unreliability. During his direct examination, Mr. Malichky described how, after Tronox announced its planned acquisition of Cristal, he met with two Tronox representatives, John Romano and Ian Mouland, "to try to get comfortable with Tronox that they weren't going to take advantage of PPG after the acquisition was completed." Malichky, Tr. 279-80; *see also* [redacted], 569. [redacted]

[9] [redacted]

[redacted] Mr. Malichky further testified that at the meeting, Mr. Romano informed Mr. Malichky that Tronox was "planning on raising the Cristal price at PPG." Malichky, Tr. 280. Mr. Malichky said that Mr. Romano told him he "thought [Cristal's] price was too low in the market." Malichky, Tr. 281. [redacted]

Questioning on cross-examination, however, revealed that Mr. Malichky had failed to tell the whole story with regard to the Tronox meeting and draft MOU. Despite having claimed that Mr. Romano informed him that Tronox was "planning on raising the Cristal price at PPG," Mr. Malichky admitted that he was aware during the meeting that Mr. Romano *did not know* the exact price Cristal was charging PPG.

> Q: At the time of this meeting, Tronox did not have approval to move forward with the acquisition; correct?
>
> A: Correct.
>
> Q: Because Mr. Romano is part of Tronox' commercial team, he is not allowed to have access to Cristal's pricing information; correct?
>
> A: That's correct.
>
> Q: He explained that to you during this meeting; correct?
>
> A: That's correct.
>
> Q: He'd also explained it to you on other occasions; correct?
>
> A: Correct.
>
> …
>
> Q: You didn't tell him what the Cristal price was to PPG during the meeting; true?

A: I did not tell him the exact Cristal price, correct.

Malichky, Tr. 563-564.

Mr. Malichky also admitted that despite saying his concern at the meeting was that Tronox would "abuse" PPG after the transaction, the actual *discussion* at the meeting centered on special treatment that PPG would be expecting from Tronox. [redacted]

Mr. Malichky even proved willing to dissemble about matters he had already addressed in his testimony. [redacted]

[redacted]

[redacted]. Mr. Malichky's purported ignorance about "most favored nation" clauses demonstrates the unreliability of his testimony.

In light of Mr. Malichky's evasiveness, omissions, and downright dishonesty, the Court should not credit any portion of his testimony.

C. Complaint Counsel's Economist's Testimony Is Not Reliable And Cannot Be Credited.

Complaint Counsel called Dr. Nicholas Hill to testify at trial as an expert in economics, but Dr. Hill's testimony is not reliable and the Court should not credit it. Dr. Hill lacks prior experience as a testifying economic expert, and his background demonstrates that he is likely to be biased in favor of the government in antitrust cases. Even more importantly, he employed economic analysis that assumed his conclusions and he relied on models that failed their own validity checks. Dr. Hill's work with his own models demonstrates their extreme sensitivity, as well, such that even minor corrections can cause wild fluctuations in results. In light of its numerous deficiencies, the Court should not credit Dr. Hill's testimony.

Dr. Hill does not have any prior experience as an economic expert. Dr. Hill has "never submitted an expert report in any case before this case." FOF ¶ 79 n.14 (Hill, Tr. 1967). Dr. Hill

has never testified before — as an expert or otherwise. FOF ¶ 79 n.14 (Hill, Tr. 1967). Dr. Hill claims that he was previously "retained as a potential testifying expert" in three cases, but Dr. Hill did not submit an expert report, was not deposed, and did not testify in any of those cases. FOF ¶ 79 n.14 (Hill, Tr. 1659-60, 1967).

Dr. Hill's experience makes him primed to be biased in favor of the government. For most of his professional life, Dr. Hill has worked on behalf of federal antitrust agencies. Prior to joining Bates White in July 2017, Dr. Hill worked for over a decade for federal antitrust agencies. FOF ¶ 78 n.14 (PX5000). Almost immediately after leaving government service, Dr. Hill was retained by the Federal Trade Commission around August 2017. FOF ¶ 79 n.14 (Hill, Tr. 1661).

Dr. Hill's approach to geographic and product market assumed his conclusions. Dr. Hill admitted that "a good way to start looking for a candidate market is to look for areas of overlap between merging firms"—but that is not what he did. FOF ¶ 334 (Hill, Tr. 1668-69, 1903) Dr. Hill knew that the transaction "is a worldwide merger" and knew that the transaction involved plants that use both the chloride process and the sulfate process. FOF ¶ 330 (Hill, Tr. 1903). But instead of starting his inquiry by analyzing the global overlap between the merging parties, Dr. Hill began his market definition inquiry by analyzing a market of sales of chloride-process titanium dioxide in the United States and Canada. FOF ¶ 437 (Hill, Tr. 1669; Hill, Tr. 1676). Even when Dr. Hill purported to test the relevant market, he baked his ultimate conclusions into his assumptions. For example, Dr. Hill assumed that the geographic market was United States and Canada when testing whether chloride TiO2 was a relevant product. FOF ¶ 364 (Hill, Tr. 1903). Ultimately, Dr. Hill ended his market definition inquiry right where he started — concluding that the "most relevant market" is "the sale of chloride titanium dioxide in the U.S. and Canada." FOF ¶ 334 (Hill, Tr. 1670).

Dr. Hill's analysis of competitive effects also shows that he has slanted his analysis to achieve the results he seeks. First, the "Capacity Closure Model" is unreliable. It (i) has not been peer reviewed or tested; (ii) contains artificial constraints biased in favor of Complaint Counsel's case; and (iii) generates outcomes that are internally inconsistent. The "Capacity Closure Model" is not widely accepted in the economic community, and it has never been subject to peer-review and publication. FOF ¶ 613 (Hill, Tr. 1961-62).

Second, the "Capacity Closure Model" assumes that no matter how high North American prices might increase: (i) North American producers of titanium dioxide will never redirect exports to be sold instead within North America; (ii) domestic producers will never increase output; and (iii) major titanium dioxide producers will never increase imports into North America.[10] FOF ¶ 630 (Shehadeh, Tr. 3331-32). Even "under the scenario where price in North America increased 79 percent, [Dr. Hill's] model still assumes that no firm would repatriate any exports." FOF ¶ 638 (Hill, Tr. 1992). Hill calls these assumptions "intentional modeling choices." FOF ¶ 641 (Hill, Tr. 1980-81). By assuming away the very possibility of a competitive reaction by rivals, Hill's model finds it would be profitable for the combined company to reduce output unilaterally. FOF ¶ 610 (Hill, Tr. 1760-61). But these "modeling choices" are entirely counter-factual.

Third, Dr. Hill's model fails its own validity checks. Dr. Hill agrees "that an important feature of the capacity closure model is that it can be applied to the world but for the merger." FOF ¶ 437 (Hill, Tr. 2000-01). Dr. Hill claims that with the "Capacity Closure Model" "you can check whether [the] model predicts that stand-alone firms have an incentive to withhold output and

[10] After receiving Shehadeh's criticisms, Hill re-ran his model to allow imports, but still assumed away any possible export repatriation and output expansion. FOF ¶ 652 (Hill, Tr. 1982-83).

thereby confirm that the model's predictions are consistent with observed behavior in the real world." FOF ¶ 617 (Hill, Tr. 2001). Dr. Hill ran his model for stand-alone Tronox and Cristal.

Dr. Hill never ran his model for stand-alone Chemours, Tronox's the largest competitor. In fact, Dr. Hill put "restriction in his code to prevent testing whether it is profitable for Chemours to withhold output unilaterally." FOF ¶ 620 (PX5004). Dr. Hill admitted that his code was designed so as to "not permit you to run a stand-alone scenario for Chemours." FOF ¶ 620 (Hill, Tr. 2004). But Dr. Shehadeh was able to examine Dr. Hill's code to run the model for stand-alone Chemours and "it shows that Chemours' behavior predicted by the model is inconsistent with the behavior of Chemours as reflected in the" real world, and thus is not "attuned to industry reality." FOF ¶ 622 (Shehadeh, Tr. 3331, 3338). This is a fatal flaw in Complaint Counsel's case; "if a model can't explain the world as it is today, then it can't be relied on to explain the world as it could be with a change or could be in the future." FOF ¶ 628 (Shehadeh, Tr. 3334).

Dr. Hill's own work also demonstrates that the "Capacity Closure Model" is extremely sensitive and even small changes or corrections result in dramatically different results. Dr. Hill submitted his original expert report to Respondents on Friday, April 6, 2018 in accordance with the deadline set out in this Court's scheduling order. Twelve days later (and just two days before the deadline for Respondents to produce expert reports), on April 18, 2018, Complaint Counsel responded to a question from Respondents' counsel about a "draft" notation in Dr. Hill's expert report. Complaint Counsel attached a new, updated expert report from Dr. Hill and stated that "Dr. Hill has made a few corrections to the coding provided … along with his report. We are submitting the updated coding along with an updated report reflecting resulting changes in a few tables." RX1645. Comparing the two reports demonstrates the extreme sensitivity—and therefore, unreliability—of Dr. Hill's economic modeling.

Dr. Hill's "few corrections" to his "Capacity Closure Model" coding dramatically changed the results the "Capacity Closure Model" obtained. Examples of these dramatic changes include:

- The coordinated capacity closure merger simulation model in Dr. Hill's original report concluded that **"2 lines at Hamilton"** would be the optimal strategy with a **15%** price increase (Figure 49), while Dr. Hill's new report concluded that **"4 lines at Hamilton"** is the optimal strategy with a **61%** price increase (revised Figure 49). The original report also concluded that the "net gain to merged firm" under this analysis was **$56 million** while the new report puts this figure at **$163 million**, approximately 200% larger than his original figure.

- The unilateral capacity closure merger simulation model in Dr. Hill's original report concluded that **"2 lines at Hamilton"** was the optimal strategy with a **15%** price increase (Figure 33), while Dr. Hill's new report concluded that **"3 lines at Hamilton"** is the optimal strategy with a **23%** price increase (revised Figure 33). The original report also concluded that the net gain to the merged firm from the optimal strategy was **$22 million**, while the new report concludes that the net gain is **$33 million**, a 50% increase.

- Even for scenarios that have not changed from one report to the next, Dr. Hill's new report shows drastically different results. For example, the original report's "2 lines at Hamilton" strategy in Figure 49 reported a "net gain" of **$56 million,** while the new report revised *those same results* to report a "net gain" of **$122 million**.

- Dr. Hill's new report dramatically changed his ranking of strategies. The "best strategy" in his original report is ranked 8 out of 10 in his new report (RX0170, Figure 22). The 'best strategy" in his new report was previously ranked 7 out of 10 in his original report (RX0170, Figure 22). *Compare* RX1650 *with* PX5000.

As a result, Dr. Hill has *himself* shown that even minor changes to his "Capacity Closure Model" code will yield very different results. A model with such sensitivity and unpredictability cannot be reliable, and Dr. Hill's reliance on such a volatile model casts doubt on the reliability of his expert views.

In addition to these indicia of unreliability, Respondents have rebutted Dr. Hill's substantive analysis at length, including through the contrary and reliable testimony of Respondents' own expert witnesses. That analysis can be found *infra* at pp. 49, 53-56, 62-63, and although not repeated here for brevity's sake, further confirms that Dr. Hill's testimony is

unreliable. The Court should not credit the testimony of Complaint Counsel's economic expert, Dr. Hill.

II. COMPLAINT COUNSEL HAS FAILED TO MEET ITS EVIDENTIARY BURDEN

A. Complaint Counsel Has Failed To Prove Its Proposed Relevant Market.

In keeping with Complaint Counsel's overall burden in Section 7 cases, "Complaint Counsel bears the burden of proving [the] relevant market within which" the transaction is likely to have "anticompetitive effects." *In re Polypore Int'l, Inc.* , 2010 WL 9434806, at *165 (citation omitted). In an effort to create a presumption of anticompetitive harm, Complaint Counsel alleges an artificially narrow market confined to chloride-process TiO2 sold in the United States and Canada. As the facts demonstrate, however, all rutile TiO2, whether produced by the chloride- or the sulfate-process, competes in a global market.

1. Complaint Counsel Has Failed To Prove Its Proposed Geographic Market

A properly defined geographic market charts "the region 'in which the seller operates, and to which the purchaser can practicably turn for supplies.'" *FTC v. Cardinal Health, Inc.*, 12 F. Supp. 2d 34, 49 (D.D.C. 1998). The market "must both 'correspond to the commercial realities of the industry and be economically significant.'" *FTC v. Arch Coal, Inc.*, 329 F. Supp. 2d 109, 123 (D.D.C. 2004) (quoting *Brown Shoe Co. v. United States*, 370 U.S. 294, 336-37 (1962)). Courts apply the "hypothetical monopolist test" to ask whether a "hypothetical profit-maximizing firm . . . that was the only present and future seller of [the relevant] products . . . likely would impose at least a small but significant and non-transitory increase in price ('SSNIP')." *FTC v. Sysco Corp.*, 113 F. Supp. 3d 1, 33 (D.D.C. 2015) (quoting the Merger Guidelines § 4.1.1). The ability to impose a SSNIP depends on "interchangeability and . . . cross-elasticity of demand." *FTC v. CCC Holdings Inc.*, 605 F. Supp. 2d 26, 38 n.12 (D.D.C. 2009). "If buyers would respond to the SSNIP

by shifting to products produced *outside* the proposed geographic market, and this shift were sufficient to render the SSNIP unprofitable, then the proposed geographic market would be too narrow." *Arch Coal*, 329 F. Supp. 2d at 123.

Complaint Counsel's claim that the relevant geographic market is limited to North America (meaning the United States and Canada) ignores that TiO2 is a globally-traded commodity. FOF ¶ 330 (Hill, Tr. 1782-83). Complaint Counsel further maintains that "a hypothetical monopolist of the sale of chloride TiO2 sales to customers in North America would find it profitable to impose a SSNIP." 05/08/2018 FTC Docket No. 9377, Complaint Counsel Pretrial Br., 16. Yet North American consumers already purchase a significant and varying percentage of TiO2 from other parts of the world. FOF ¶ 347 (RX0170; Shehadeh, Tr. 3225); FOF ¶ 294 (Turgeon, Tr. 2670-71).

[redacted] Moreover, even Complaint Counsel's economic modeling shows that a hypothetical monopolist could not profitably impose a SSNIP in North America, confirming that Complaint Counsel's North American (U.S./Canadian) market is improperly narrow. FOF ¶¶ 331 n.32, 697 (Shehadeh, Tr. 3203, 3392, 3399-3400; Hill, Tr. 1781-82).

a. TiO2 Customers Can Turn To Global Trade In Response To A SSNIP.

Complaint Counsel's gerrymandered geographic market ignores trade flows in the North American supply of TiO2. FOF ¶¶ 331, 333 (Shehadeh, Tr. 3203, 3392; Hill, Tr. 1784-85). TiO2 is convenient and inexpensive to ship, has essentially an infinite shelf life, and can be used to serve international customers at a low cost. FOF ¶¶ 512, 283, 284 (Stern, Tr. 3840-41; Mei, Tr. 3154, 3157-58). TiO2 producers in every region of the world, including North America, supply their products globally. FOF ¶ 274 (RX0171; Shehadeh, Tr. 3210-11). Trade flows in and out of North

America amply demonstrate this point. FOF ¶ 286 (Shehadeh, Tr. 3212). The United States itself exports more than half of its TiO2 production and imports almost a third of its consumption. Stern, Tr. 3817. Each year, Tronox exports approximately [redacted] of the production at its Hamilton plant to foreign nations. FOF ¶ 281 (Mei, Tr. 3161; Shehadeh, Tr. 3210). Furthermore, the amount of TiO2 imported to North America is rising year by year. FOF ¶¶ 298, 299, 300 (Shehadeh, Tr. 3220). From 2010 to 2016, Chinese imports of TiO2 into North America increased by "approximately [redacted] times." FOF ¶ 300 (Shehadeh, Tr. 3220-21). Although no Chinese producers make TiO2 in North America, Chinese producers now account for [redacted] of TiO2 consumed in North America.

b. Prices In North America Are Co-Integrated With Global Prices.

The global flow of the TiO2 trade is reflected in global TiO2 prices. [redacted] TiO2 prices are "co-integrated" because "they move together and, when they deviate, they ultimately return to a long-term equilibrium relationship." FOF ¶¶ 312, 313 (Shehadeh, Tr. 3451; RX0170). [redacted]

Furthermore, there is no "regional price" for TiO2. FOF ¶ 272 (Romano, Tr. 2233). Tronox establishes prices for TiO2 by negotiating *individually* with every customer around the world. FOF ¶ 73 (Mouland, Tr. 1247). As noted, when Tronox uses the term "regional pricing," it is simply referring to an *average* of all customers' prices within a geographic area that Tronox deems to be a region for organizational reasons. FOF ¶ 75 (Mouland, Tr. 1252-53). Likewise, the facts (using techniques published by the FTC's own economists) demonstrate that TiO2 prices averaged by geographic region move together in a way that is "statistically and economically significant" and confirm "that the relevant market is broader than North America." FOF ¶ 308 (Shehadeh, Tr. 3229-30).

The trade flows of TiO2 respond to even small variations in price among regions, consistent with a global market for TiO2. FOF ¶ 305 (Shehadeh, Tr. 3229). When prices rise in the U.S. relative to other regions, net imports also increase soon thereafter, as TiO2 producers respond to price by selling more product in the U.S. FOF ¶ 660 (Shehadeh, Tr. 3365-66). Despite this real-world evidence, Complaint Counsel contends that "customers have been unable to use arbitrage to defeat the higher prices in North America." 05/08/2018 FTC Docket No. 9377, Complaint Counsel Pretrial Br., 21. [redacted] Despite the artificial limits Complaint Counsel tries to impose, the record evidence is overwhelming that the production, supply, trade, and sale of TiO2 are all global.

c. In The North America Geographic Market, A Hypothetical Monopolist Would Not Be Able To Impose A SSNIP.

Applying the hypothetical monopolist test confirms that Complaint Counsel failed to define its geographic market properly. North American customers have the incentive and ability to purchase from the significant quantities of TiO2 already moving in global trade flows, which would render a SSNIP by a hypothetical monopolist unprofitable. RX0170. Complaint Counsel's economist, Dr. Nicholas Hill, reaches the opposite conclusion based on flawed assumptions. As Tronox's expert, Dr. Ramsey Shehadeh, demonstrated, Hill's model gives the hypothetical monopolist control over supply both inside *and outside* the proposed relevant market. FOF ¶ 343 (Shehadeh, Tr. 3205-06). Based on this assumption, Hill concludes that North American customers will not be able to respond to the hypothetical monopolist's SSNIP by seeking supply from plants outside the proposed geographic market or by accessing any of the significant volume of TiO2 currently produced in North America that is currently exported from North America. FOF ¶ 343 (Shehadeh, Tr. 3205-06). That assumption is false: The evidence demonstrates that competition outside of North America (indeed, inside North America too), is robust, thus negating any suggestion that a hypothetical monopolist could control supply outside of the FTC's misguided geographic market. With this flawed assumption, Hill draws his market too narrowly, which is why his model results conflict with real-world evidence about TiO2 markets. FOF ¶ 338 (Shehadeh, Tr. 3206).

2. Complaint Counsel Has Failed To Prove Its Proposed Product Market.

Complaint Counsel maintains that the relevant product market is TiO2 produced using the chloride process and sold to customers in North America, which excludes sulfate-process TiO2. But chloride- and sulfate-process TiO2 are interchangeable in the vast majority of applications,

and there are strong cross-elasticities of demand for TiO2 produced with either process. FOF ¶ 369 (RX1503; Shehadeh, Tr. 3673-74).

As an initial matter, Complaint Counsel's claim here regarding the product market for TiO2 cannot be reconciled with the FTC's own past positions. When reviewing TiO2 producer DuPont's proposed acquisition of the TiO2 division of Imperial Chemical Industries ("ICI") in 1998, the FTC found direct competition between chloride and sulfate process TiO2. In the merger review, the Commission found a single TiO2 market that included both sulfate- and chloride-process TiO2 and acknowledged the significant global trade in TiO2. *See* FOF ¶ 438 n.49 (RX1598).

The evidence demonstrates that North American TiO2 customers use both sulfate and chloride process TiO2 in their products in North America. [redacted] Third-party analysts recognize that chloride- and sulfate-process TiO2 are interchangeable and affect the price of each other. Barclays noted in 2016 that both processes create TiO2 that is fungible, whether produced in China or by Western producers. FOF ¶ 388 (Turgeon, Tr. 2736; Shehadeh, Tr. 3536; RX0251). Approximately 80% of TiO2 end-use products can be made with either sulfate- or chloride-process TiO2; only about 10% of products are more compatible with one process or the other. FOF ¶ 369 (Turgeon, Tr. 2622-23; Stern, Tr. 3835-39; Shehadeh, Tr. 3319; RX1503; PX9020; RX1503).

Complaint Counsel has claimed that chloride- and sulfate-process TiO2 have different properties—such as durability, tint strength and opacity—affecting their interchangeability in some applications. Defendants refuted this assertion through testimony and the presentation of real evidence showing that producers may control these properties through the finishing process, regardless of how the TiO2 is produced. FOF ¶¶ 381, 382 (Engle, Tr. 2433, 2444, 2477-78, 2453-54, 2480). Coatings produced with chloride- and sulfate-process TiO2 can look the same. FOF ¶ 372 (Engle, Tr. 2466-67) (referring to RXD0016); Engle, Tr. 2464-65). [redacted]

Testimony demonstrates that chloride-process TiO2 competes both directly and indirectly with sulfate-process TiO2. FOF ¶¶ 514, 413, 396, 371 ((Romano, Tr. 2241-42; Christian, Tr. 933-35; Turgeon, Tr. 2673-74; [redacted] Customers also routinely leverage prices for sulfate-process grades in price negotiations about chloride-process grades. FOF ¶ 413 (Romano, Tr. 2241; Christian, Tr. 933-35; Turgeon, Tr. 2675).

Customers also switch between chloride- and sulfate-process TiO2. They can and do reformulate their products to use TiO2 from either process. [redacted]

[redacted]

Prices for chloride- and sulfate-process TiO2 are tied to each other, further indicating a single product market. "[T]here is a long-term relationship between sulfate and chloride titanium dioxide prices" characterized by "statistically and economically significant co-movement of prices. FOF ¶¶ 419, 429, 433 (Shehadeh, Tr. 3288-89). [redacted] At bottom, the different processes for producing TiO2 do not define different products. Rather, TiO2 from either process competes within the same global product market.

3. Complaint Counsel Cannot Show A Presumption Of Anticompetitive Effects.

It is Complaint Counsel's burden to show that the challenged transaction will result in "undue concentration in the market." *Baker Hughes*, 908 F.2d at 982. "Market concentration is a function of the number of firms in a market and their respective market shares." *Sysco Corp.*, 113 F. Supp. 3d at 52 (citing *Merger Guidelines* § 5.3). Complaint Counsel has failed to meet its burden to show the relevant market is limited to chloride-process TiO2 sold in the United States and Canada. When measured against a global market for rutile TiO2, the proposed transaction does not raise any market-concentration concerns. FOF ¶ 453 (Shehadeh, Tr. 3325-26). The FTC's own economic expert testified that he believes that calculating market shares on a global basis would result in concentration numbers that "would be lower" than those he calculated for his proposed North American market; the combined company would have a market share of 20.1 percent. FOF ¶ 459 (Hill, Tr. 1942, 1946).

The same conclusion would hold even if Complaint Counsel were able to prove the relevant market is limited to sales to customers in the United States. Section 5.2 of the Merger Guidelines explains that in a commodity market, market share should be calculated based on capacity *readily available* to serve the market. That capacity is global in this case, not limited to North America. [redacted] This principle recognizes that buyers would adjust their sources of supply in response to a price increase by the combined firm. Although Complaint Counsel's economist made no effort to propose an alternative to the alleged North American market, he conceded that market concentration almost certainly would not be problematic in a global TiO2 market. FOF ¶¶ 455, 458 (Hill, Tr. 1946, 1948).

Having failed to establish its proposed geographic and product markets, and having declined to propose any alternative markets for either, Complaint Counsel is left without any presumption that this transaction will have anticompetitive effects. Instead Complaint Counsel needs to demonstrate a likelihood of actual anticompetitive effects in order to prevail on the merits of its case.

B. Complaint Counsel Has Failed To Show That Post-Acquisition Unilateral Output Reduction Is Likely.

In order to try to demonstrate anticompetitive effects, Complaint Counsel offers the thesis that the combined entity will reduce output in order to raise prices after the transaction closes. Complaint Counsel's economist relies on his "Capacity Closure Model"—a model he developed himself—to claim that the combined company is likely to decrease production in order to raise prices. FOF ¶ 609-12 (Hill, Tr. 1957-58, 1759). The model is flawed as a matter of theory and also as a matter of fact. In this highly competitive market, even a small competitive response would make an attempt to reduce supply unprofitable.

The "Capacity Closure Model" is unreliable. It (i) has not been peer reviewed or tested; (ii) contains artificial constraints biased in favor of Complaint Counsel's case; and (iii) generates outcomes that are inconsistent with actual results. The "Capacity Closure Model" is not widely accepted in the economic community, and it has never been subject to peer-review and publication. FOF ¶ 613 (Hill, Tr. 1961-62). It assumes that no matter how high North American prices might increase: (i) North American producers of titanium dioxide will never redirect exports to be sold instead within North America; (ii) domestic producers will never increase output; and (iii) major titanium dioxide producers will never increase imports into North America.[11] FOF ¶¶ 62-30 (Shehadeh, Tr. 3331-32). Hill calls these assumptions "intentional modeling choices." FOF ¶ 640 (Hill, Tr. 1980-81). By assuming away the very possibility of a competitive reaction by rivals, Hill's model finds it would be profitable for the combined company to reduce output unilaterally. FOF ¶ 610 (Hill, Tr. 1760). But these "modeling choices" are entirely counter-factual.

Nor is the "Capacity Closure Model" even a good fit for assessing the real-world TiO2 industry. Hill explains that an "important feature of the capacity closure model is that it can also be applied to the world but for the merger." FOF ¶ 437 (Hill, Tr. 2000-01; Shehadeh, Tr. 3335-36). In particular, he testified that "you can check whether [the] model predicts that stand-alone firms have an incentive to withhold output and thereby confirm that the model's predictions are consistent with observed behavior in the real world." FOF ¶ 617 (Hill, Tr. 2001). Hill's validity test fails for Chemours, a multi-billion-dollar U.S. chemical company and the world's largest TiO2 producer. When Hill's model is run "for Chemours using his model and his data, it shows that Chemours' behavior predicted by the model is inconsistent with the behavior of Chemours as

[11] After receiving Shehadeh's criticisms, Hill re-ran his model to allow imports, but still assumed away any possible export repatriation and output expansion. FOF ¶ 652 (Hill, Tr. 1982-83).

reflected in the" real world, and thus is not "attuned to industry reality." FOF ¶ 726 (Shehadeh, Tr. 3330-31, 3337-38). This is a fatal flaw; "if a model can't explain the world as it is today, then it can't be relied on to explain the world as it could be with a change or could be in the future." FOF ¶ 628 (Shehadeh, Tr. 3334).

The "Capacity Closure Model" is not only flawed as a matter of theory, but it is also vulnerable to slight changes in sales of TiO2. The model shows that even a small response from rivals would wipe out any benefit from decreasing output. FOF ¶¶ 663-68 (Shehadeh, Tr. 3370-74, 3382-83). In particular, the model predicts that if rival TiO2 suppliers increased production by just [redacted], then there would be no advantage from decreasing TiO2 production. FOF ¶¶ 663-68, 669 (Shehadeh, Tr. 3370-74, 3382-83; Hill, Tr. 1985-86). To put that amount in perspective, from 2002 to 2016, annual imports of rutile titanium dioxide into North America alone varied from 75,000 to over 200,000 metric tons per year. FOF ¶ 292 (Hill, Tr. 1901; PX5000-035, Fig. 13; Shehadeh, Tr. 3217-18). Between 2002 and 2016, North American exports of chloride-process TiO2 ranged from over 400,000 to almost 700,000 metric tons per year. FOF ¶ 304 (Hill, Tr. 1902; PX5000-038, Fig. 15). When the availability of TiO2 supply from other regions is considered, as it would be in the real world, the total amount of product in the marketplace expands even more.

Complaint Counsel is also incorrect when it claims that Defendants have reduced—or even that Defendants could reduce—output in the TiO2 industry in order to increase price:

- Even after extensive discovery, Complaint Counsel could not identify a *single* example where *any* TiO2 producer adjusted output "for the purpose of supporting higher prices rather than maintenance or operational issues." FOF ¶ 589 (FTC Resp. to Cristal Interrog. No. 1).
- Their own model shows that pre-merger Tronox and [redacted] do not have "an incentive to withhold output" [redacted] (Hill, Tr. 2001, [redacted]

- TiO2 suppliers do not reduce output to support prices. Any reduction in output is a matter of last resort because TiO2 production is a high fixed-cost operation in which profitability depends on *full-capacity* utilization. FOF ¶ 580 (Christian, Tr. 864, 881); FOF ¶¶ 572, 575 (Stern, Tr. 3712). Because of this high fixed cost structure, "the harder you run [the plants], the lower your fixed costs per pound of product produced." FOF ¶¶ 572, 575 (Stern, Tr. 3712).

- Those periods when Defendants did reduce output were during historically severe price declines, including from 2012 to early 2016. FOF ¶ 602 (Stern, Tr. 3731; RX0171). TiO2 producers' prices and margins, including Tronox and Cristal's, dropped sharply during this period. FOF ¶ 602 (Stern, Tr. 3730-31; RX0171). The situation continued to deteriorate from 2015 to 2016, with Tronox experiencing an income loss from operations in each quarter from Q3 2015 to Q2 2016. FOF ¶ 568 (Stern, Tr. 3768). [redacted]

- Finally, historic price data shows that any output reductions by Cristal or Tronox did not affect plummeting prices. FOF ¶ 595 (Stern, Tr. 3770). Despite variability in Tronox's production at its Hamilton plant, prices continued to move on an independent, downward trajectory. FOF ¶ 595 (Stern, Tr. 3770).

In the final analysis, Complaint Counsel cannot show there is a risk of unilateral anticompetitive effects arising from the transaction. Complaint Counsel's untested theories and economic models do not support the claims about this transaction Complaint Counsel set out to prove.

C. Complaint Counsel Has Failed To Show That Post-Transaction Coordination Is Likely.

Complaint Counsel's theory of coordinated effects—the theory that post-transaction, the marketplace will be more concentrated and thus more susceptible to coordinated pricing—is also flawed. FOF ¶¶ 714-16 ([redacted]; Stern, Tr. 3801). Price coordination does not occur in the TiO2 market, and coordination will not become more likely as a result of the transaction. FOF ¶¶ 705-06, 717, 724 (Shehadeh, Tr. 3409). Where a regulator asserts that coordinated effects will be likely post-transaction, it must prove that such effects are probable. *See Baker Hughes*, 908 F.2d at 984; *United States v. Oracle Corp.*, 331 F. Supp. 2d 1098, 1109 (N.D. Cal. 2004) (rejecting Section 7 claim where government failed to prove market participants "would *likely* engage in coordinated interaction" post-merger (emphasis added)). Complaint Counsel

cannot satisfy that burden here. Coordination, at a minimum, "requires harmonizing the incentives of participating firms and mitigating firm uncertainty concerning rival firms, so that they can effectively coordinate their behavior." *In re B.F. Goodrich Co.*, No. 9159, 110 F.T.C. 207, 1988 WL 1025464, at *65 (FTC Mar. 15, 1988), *modified by* 1989 WL 1126669 (F.T.C. Apr. 5, 1989). Coordination also requires the ability effectively to enforce the consensus. In other words, firms will not coordinate production or pricing unless they can "retaliate effectively if and when cheating occurs." *Id.* at *65.

1. Coordination Is Not Possible Because TiO2 Prices Are Individually Negotiated With Customers And Subject To Fierce Competition.

Despite Complaint Counsel's characterizations, there are no "list" prices for TiO2. FOF ¶73 (Romano, Tr. 2227; Mouland, Tr. 1247). Customers for TiO2—including large, sophisticated buyers, many of whom dwarf Tronox and Cristal by any measure of corporate size—negotiate the prices they pay. FOF ¶ 531 (Mouland, Tr. 1247); *see, for example*, FOF ¶ 80 (Mouland, Tr. 1193-94). Accordingly, prices charged by producers are a function of a multitude of factors. [redacted] Many customers negotiate annual contracts with producers to govern terms of their purchases, but these contracts almost never set the price the customer must pay throughout the life of the contract. FOF ¶ 533 (Young, Tr. 710; Stern, Tr. 3727-29). Instead, most contracts provide for *negotiated* prices and customers typically have the option under the contracts to switch suppliers if they find a better price. FOF ¶ 533 (Stern, Tr. 3727-29; *see also* Young, Tr. 710). [redacted]

The competitiveness of the TiO2 market is further intensified by the buying power of TiO2 customers. TiO2 customers obtain lower prices by soliciting multiple bids for purchases, qualifying multiple suppliers for the same applications, leveraging producers against one another, and qualifying new suppliers. *E.g.*, FOF ¶¶ 413, 531 (Romano, Tr. 2241; Christian, Tr. 933-35; Turgeon, Tr. 2675; [redacted]). Customers, in other words, pit competitors against each other. Because producers must remain cost-competitive and produce as much TiO2 as possible, even small reductions in sales can have a disproportionate negative impact. FOF ¶ 577 (Stern, Tr. 3773). At the same time, shipping TiO2 is inexpensive, and Defendants face competition from Western and Chinese suppliers in every corner of the globe. FOF ¶ 284 (Mei, Tr. 3158-60); FOF ¶¶ 464-67, 474-75 (Mouland, Tr. 1206-09). Coordination is implausible and unsustainable in this market. FOF ¶¶ 714-16 ([redacted]; Stern, Tr. 3801).

2. Price Increase Announcements Do Not Demonstrate Coordination And Are A Legitimate Part Of The Competitive Process.

As a fallback, Complaint Counsel has attempted to show that public price increase announcements, some of which occurred close in time and were similar in amount, are evidence that TiO2 producers tacitly coordinate price. In a global, cyclical market such as the TiO2 market, however, supply and demand drives prices to trend in the same direction and relative magnitude in every region of the world simultaneously. FOF ¶ 306 (Turgeon, Tr. 2672). Public announcements reflect nothing more than independent business decisions by producers experiencing similar marketplace factors. FOF ¶ 710 (Shehadeh, Tr. 3511-13). More importantly, the mere fact that a producer *announces* a price increase is no guarantee of how much the *actual* price will increase (if at all). The truth is that price increases are dependent on supply and demand conditions and competition. FOF ¶ 80 (Romano, Tr. 2234). [redacted]

[redacted]

Furthermore, price change announcements are necessary because they serve as notices for customers who bargain for price-protection; producers cannot change prices for these customers for contractually specified periods of time (often 90, 120, or even 180 days) after a price increase has been announced. FOF ¶ 82 (*see, for example,* [redacted]; Young, Tr. 687; Stern, Tr. 3728-29). Complaint Counsel misconstrues price changes as anticompetitive, when in fact they reflect the pro-competitive desire of producers to compete vigorously in the face of shifting supply and demand conditions.

3. Output Reductions Do Not Demonstrate Coordination And Reflect Sound Business Decisions.

Similarly, suppliers' behavior regarding output and plant capacity is inconsistent with tacit coordination. Although Complaint Counsel argues that examples of plant closures indicate a coordinated attempt to curtail output, closures in fact reflect efforts to lower the overall cost of production by shuttering high cost, outdated, or obsolete assets. [redacted]. In addition, such closures are more than offset by close-in-time and ongoing investments in debottlenecking and line additions at other plants and greenfield capacity construction efforts to *increase* capacity, as well as decisions to optimize supply globally through international trade. [redacted], 3362)**.** All of these efforts to lower cost and increase capacity contravene Complaint Counsel's allegations that the suppliers in this industry are coordinating on price or output reductions.

The varied incentives and cost structures of suppliers in the TiO2 industry, as well as the lack of transparency regarding actual pricing and output, render any potential effort to coordinate pricing or production behavior extremely difficult to conceive, monitor, and enforce. FOF ¶¶ 707-08, 718, 714-716, 720 (Stern, Tr. 3793, 3801; Shehadeh, Tr. 3410, 3418; [redacted]). Unsurprisingly then, the evidence of what actually happens in the market is inconsistent with coordination. Instead, by expanding capacity, lowering the costs of production and expansion, and increasing the extent of vertical integration, the proposed transaction creates even greater diversity in incentives and further reduces transparency in the cost structure and incentives of the post-transaction entity. FOF ¶ 706 (Shehadeh, Tr. 3409).

4. Complaint Counsel's References To Price-Fixing Cases Are Inapposite.

In its pre-trial brief and opening statement, Complaint Counsel repeatedly referred to two price-fixing cases to which Tronox was not a party: *Valspar Corp. v. E.I. Du Pont De Nemours & Co.*, 873 F.3d 185 (3d Cir. 2017), and *In re Titanium Dioxide Antitrust Litigation*, 959 F. Supp. 2d 799, 823 (D. Md. 2013). Notably, the Complaint Counsel did not return to these opinions when eliciting evidence in these proceedings, and with good reason: these citations only underscore the weakness of Complaint Counsel's litigation positon.

To begin, the passages on which Complaint Counsel relies are not *holdings* on coordinated effects in the TiO2 industry. In *In re Titanium Dioxide*, Complaint Counsel's quoted language merely describes a *disputed issue of material fact* that precluded summary judgment. 959 F. Supp. 2d at 823; Complaint Counsel Opening Statement, Tr. 22. By definition, that is not evidence of anything. The decisions in *Valspar* specifically reject coordination, granting summary judgment in favor of DuPont and concluding that no reasonable jury could find "express collusion" in the industry. *Valspar Corp. v. E.I. Du Pont De Nemours*, 152 F. Supp. 3d 234, 248, 250, 252 (D. Del. 2016), *aff'd*, 873 F.3d 185. Indeed, the Third Circuit's conclusion on this point is clear. *See* 873

F.3d at 202. These courts were not even asked to rule on whether there was tacitly coordinated pricing or production among TiO2 producers.

Complaint Counsel has quoted the *Valspar* decision out of context: "the market was primed for anticompetitive interdependence and … it operated in that manner" Vote, Tr. 23. This quotation misleads this Court in at least two respects. First, the court was merely observing that for purposes of granting *summary judgment* in favor of defendant DuPont, it must review the facts in the light most favorable to Valspar. *Valspar*, 873 F.3d at 190. No court made a factual finding that Valspar's assertion was correct. Second, had the district court not granted summary judgment, defendants were prepared to show that the allegations were baseless; indeed, defendants argued that no overcharge existed at all (and they were merely not challenging the overcharge "for purposes of this [summary judgment] motion"). *Valspar*, 152 F. Supp. 3d at 243.

Complaint Counsel's citation of these cases is also factually inapposite. The decisions concerned conduct beginning in 2001 and ending in 2013 involving a program developed through the Titanium Dioxide Manufacturers Association ("TDMA"), a European trade association. *Valspar*, 873 F.3d at 190. That program involved the blind aggregation of producer production, inventory, and sales volumes on a confidential basis, and the dissemination of the *aggregated* information. *Valspar*, 152 F. Supp. 3d at 238, 245. The plaintiffs alleged that this statistics program helped TiO2 producers coordinate public price increase announcements. While the Third Circuit ultimately rejected the argument that this program was unlawful, it is worth noting that the program has not existed since 2013. *Valspar*, 873 F.3d at 190 ("Valspar claims the conspiracy ended in late 2013 when DuPont exited the TDMA.") Given how the claims about these price-fixing cases fall apart on review, it should come as no surprise that Complaint Counsel hardly mentioned them in this proceeding. The price-fixing cases came up only twice during the hearing:

first during the FTC's opening statement, which is not evidence at all; and second as an oblique reference during the direct examination of Complaint Counsel's economic expert. (Vote, Tr. 9, 22-23, 25; Hill, Tr. 1808).

5. Tronox Has No Incentive To Coordinate With Competitors As A Result Of The Proposed Acquisition.

Complaint Counsel's purported evidence of coordinated anticompetitive effects also defies reality. To bolster its contention that Tronox will coordinate with competitors post-merger, Complaint Counsel doubles down on Hill's "Capacity Closure Model." In addition to the flaws discussed above, [redacted] and that his model assumes "perfect communication" between post-merger Tronox and competitor Chemours while ignoring "free rider" incentives the companies would face. FOF ¶¶ 672, 728(c), 729 ([redacted], 1994; Shehadeh, Tr. 3413-14). Simply put, Hill's model predicts behavior divorced from the real world. FOF ¶¶ 726, 592 (Shehadeh, Tr. 3412-13; Stern, Tr. 3854). Defendants' chemicals industry expert, who has spent four decades in the field, testified that in all of his experience, he had *never* seen the type of coordinating behavior predicted by Hill's model, branding it a "ridiculous theory." FOF ¶¶ 715-16 (Stern, Tr. 3801). [redacted]

When viewed in reality, rather than through the prism of Complaint Counsel's hypothetical theories, the transaction incentivizes the merged company to compete fiercely by producing maximum product in order to distribute fixed-costs across the broadest base possible. FOF ¶¶ 121, 124 (Stern, Tr. 3852). Such a strategy allows Tronox to fulfill its ultimate goal in the transaction: improving its cost-position against low-cost producers such as Chemours and Lomon Billions. FOF ¶ 23, 124, 569(b) (Quinn, Tr. 2317, 2345-46; Turgeon, Tr. 2642-43; Stern, Tr. 3852). The

transaction's output-enhancing efficiencies create an increase of TiO2 in the market. FOF ¶ 101 (Shehadeh, Tr. 3442-44). More supply in the global market will benefit consumers and customers by decreasing prices. FOF ¶¶ 101, 130 (Shehadeh, Tr. 3442-44; Mei, Tr. 3167).

D. The Acquisition Will Result In Substantial Synergies That Enhance Output, Lower Costs, And Improve Competition For The Benefit Of Consumers.

The transaction will also result in verified, merger-specific synergies that will increase TiO2 output, benefitting consumers. Complaint Counsel has not rebutted (because it cannot) these synergies.

1. The Proposed Transaction Is Pro-Competitive In An Already Fiercely Competitive Industry.

The proposed transaction is pro-competitive because it will expand output and make the parties' TiO2 plants more competitive in an already competitive marketplace. FOF ¶¶ 100, 218 (Shehadeh, Tr. 3441-42; Quinn, Tr. 2363-64). Tronox produces more TiO2 feedstock than its TiO2 pigment plants can consume, while Cristal's TiO2 production exceeds its feedstock production. FOF ¶¶ 22, 113 (Turgeon, Tr. 2601-04; 3901-02; Van Niekerk, Tr. 3901-02). Combining the two companies' feedstock and TiO2-producing capabilities will create greater vertical integration, leading to lower costs, expanded output, and lower pricing. FOF ¶ 219 (Stern, Tr. 3790); FOF ¶¶ 101(b), 102, 220 (Shehadeh, Tr. 3444-45). Further, while Tronox has a consistent record of operating its plants at or near the limits of their design capabilities, Cristal has not been able to achieve that level of production, dogged instead by chronically underperforming plants that rarely produce TiO2 anywhere near their "name plate" capacity or design capabilities. FOF ¶ 135 (Quinn, Tr. 2350-51). Thus, the transaction presents important and procompetitive opportunities to increase production at Cristal's plants. FOF ¶¶ 131, 133, 161 (Dean, Tr. 2917, 3027-29). Tronox is the ideal acquirer to increase Cristal's output. FOF ¶ 150 (Dean, Tr. 2930-31; 2355-31; Quinn, Tr. 2355). The technology and plant design of Cristal's Yanbu facility is

identical to that of Tronox's Hamilton facility. Dean, Tr. FOF ¶¶ 154-55 (Dean, Tr. 2977, 2979, 3044). Moreover, Tronox has developed internal best practices that, when applied to Cristal, will ensure that Cristal plants operate at similarly high levels of utilization. FOF ¶ 125 (Quinn, Tr. 2349-50; PX0010); FOF ¶ 160 (Dean, Tr. 2994-95 (discussing Yanbu Transformation plan)). Tronox has already proven its ability to increase plant output by establishing a long record of doing so at its own facilities.

Needless to say, increasing output of TiO2 will benefit customers. FOF ¶ 101 (Shehadeh, Tr. 3442-44); FOF ¶ 130 (Shehadeh, Tr. 3443; Mei, Tr. 3167); FOF ¶¶ 104-05, 121 (Romano, Tr. 2216-17; Quinn, Tr. 2363-64). Indeed, Tronox's customers "are much bigger" than Tronox, "especially in the coatings industry, [where] the paint companies are multiple times" Tronox's size. FOF ¶ 24 (Quinn, Tr. 2345-46; PX0010); FOF ¶ 105 (Romano, Tr. 2216-17). Tronox's customers have been growing and "wanted Tronox to grow with them," and the Cristal transaction was an "obvious way for [Tronox] to meet [its] customer requirement" and grow along with its customers. FOF ¶ 24 (Turgeon, Tr. 2645). To succeed in the modern marketplace, Tronox must lower its costs to serve its customers and compete with the larger players, like low-cost producer Chemours. FOF ¶¶ 23-24 (Quinn, Tr. 2345-46; Turgeon, Tr. 2645, 2659). Increasing output will allow the combined company to move "towards the lower cost end of the curve" which will "enable the merged entity to more effectively compete against Chemours and other low-cost producers like the Chinese." FOF ¶ 219 (Stern, Tr. 3790; Arndt, Tr. 1406).

2. The Transaction Will Reduce Fixed Costs Through Vertical Integration.

The combined company will also realize significant synergies by reducing fixed costs through vertical integration. FOF ¶¶ 219-20 (Stern, Tr. 3790-91). This too benefits consumers. *First*, vertical integration eliminates one or two levels of margins from the production costs of

TiO2 pigment—the feedstock producer's margin, and if the feedstock producer did not have its own source of ilmenite (a key raw material), the margin from the mine owner. FOF ¶ 117 (Shehadeh, Tr. 3420-21). *Second*, vertical integration ensures a stable and steady supply of feedstock, incentivizing the combined entity to invest in its mining operations and eliminating volatility introduced by third-party feedstock providers. FOF ¶ 184 (Mancini, Tr. 2792-94).

Again, the transaction with Cristal is "a perfect fit because [Tronox] will be able to use that excess feedstock" that Tronox already has to feed Cristal's pigment plants. FOF ¶ 116 (Turgeon, Tr. 2604). The combined company will be capable of supplying the majority of its own feedstock needs. FOF ¶ 115 (Turgeon, Tr. 2604; Quinn, Tr. 2361-62). At the same time, output-expanding efficiencies at the feedstock level will both "enhance the incentives of the postmerger Tronox to expand output of pigment" as well as "free up" additional sources of feedstock supply "for other competitors." FOF ¶¶ 101(b), 102, 220 (Shehadeh, Tr. 3444-45). Those efficiencies almost certainly will increase total pigment production and total feedstock supply in the market. FOF ¶¶101(b), 102, 220 (Shehadeh, Tr. 3444-45).

3. The Transaction's Output-Enhancing Synergies Are Strong And "Merger Specific."

Importantly, these synergies are "merger specific," i.e., they not would occur if the transaction were blocked. Simply put, the proposed transaction presents a unique opportunity to enhance TiO2 output by improving Cristal's TiO2 plant in Yanbu, Saudi Arabia, and improving Yanbu production is a key goal of the proposed transaction. FOF ¶¶ 131, 133, 161 (Dean, Tr. 2917, 3027-29). Yanbu's current performance is "[e]xtremely subpar," producing TiO2 at levels well below its nameplate capacity. FOF ¶¶ 134-35 (Dean, Tr. 2979-80, 2982-83; Stoll, Tr. 2123; Quinn, Tr. 2350-51). Cristal's efforts to bring in outside expertise to improve the Yanbu facility have not resulted in sustainable improvements. FOF ¶¶ 139-42 (Dean, Tr. 2980-81, 2984-85,

2980-81, 3073, 3131-32; Stoll, Tr. 2123). The planned enhanced output of TiO2 production post-transaction at Yanbu is a merger-specific synergy that will benefit customers by increasing TiO2 pigment available in the market. FOF ¶ 127 (Mancini, Tr. 2782-85). [redacted]

Tronox's predecessor, Kerr McGee, built Yanbu with its *own* technology. FOF ¶ 146 (Dean, Tr. 2930, 2979; Hewson, Tr. 1608-09). The Yanbu plant is nearly identical in every material way to Tronox's TiO2 plants, including Tronox's Botlek, Kwinana, and Hamilton facilities. FOF ¶¶ 154-55 (Dean, Tr. 2977, 2979). As the legacy company of Kerr McGee, Tronox is the best operator of Kerr McGee technology and has a "unique skill set to be able to bring to [Yanbu] that no other company in the world possesses." FOF ¶¶ 150, 153 (Quinn, Tr. 2355-56; Dean, Tr. 2930-31; Mancini, Tr. 2790-91; Stern, Tr. 3851). Cristal, by contrast, lacks that expertise. FOF ¶¶ 150, 152, 145 (Dean, Tr. 2930-31; Turgeon, Tr. 2657-59; [redacted]). The proposed transaction therefore will enhance TiO2 output by lending Tronox's particular expertise to the Yanbu plant, increasing that facility's production and succeeding where Cristal's many attempts at output enhancement have failed.

A similar story can be told about the "Jazan slagger," a Cristal-owned (but non-operating) feedstock-producing facility. The benefits of vertical integration will be further enhanced by the repair and restart of the defunct Jazan slagger, enabling Tronox to run its "feedstock assets at full rates." FOF ¶¶ 115, 183 (Quinn, Tr. 2361-62; Turgeon, Tr. 2604; Van Niekerk, Tr. 3941-42, 3953-55). Again, no entity other than Tronox can and will fix the Jazan slagger. FOF ¶¶ 193, 194, 185, 211 (Quinn, Tr. 2357-59; Van Niekerk 3926-27, 3961; Turgeon 2584-85; Mancini, Tr. 2798-99; [redacted]). Only Tronox has the incentive and interest in operationalizing Jazan to increase

feedstock production for TiO2. FOF ¶¶ 181, 182, 185 (Mancini, Tr. 2795; Van Niekerk, Tr. 3901-02, 3945-46; [redacted]). Cristal encountered significant problems when it attempted to commission the Jazan slagger in 2015 and those issues have continued to today. FOF ¶ 186 (Van Niekerk, Tr. 3900). Hence, from the inception of the transaction, Tronox has "always considered" the Jazan slagger as being a "part of the Transaction." FOF ¶ 203 (Quinn, Tr. 2316; RX0236). The Jazan slagger is part of this transaction by virtue of an Option Agreement and Technical Service Agreement ("TSA"). FOF ¶ 204 (Van Niekerk, Tr. 3900-01). Incorporating the Jazan slagger in this way is a standard design for a transaction of this size. FOF ¶ 210 (Quinn, Tr. 2312-13).

Tronox will make the Jazan slagger operational. The Option Agreement and TSA are concrete and certain agreements to purchase the Jazan slagger, both finalized and signed in May, 2018. Thus, Tronox has agreed to invest substantial financial resources in addition to its technical knowledge. FOF ¶¶ 212-14 (Quinn, Tr. 2426; Van Niekerk, Tr. 3955-58). Furthermore, "almost immediately after [the TSA] agreement was signed, [Tronox] began training personnel;" maintaining onsite presence; consulting with Cristal on Jazan's design issues; and "[m]a[king] several significant contributions and suggestions for doing things differently." FOF ¶ 212 (Quinn, Tr. 2426).

4. The Transaction Will Result In Significant Cost-Saving Efficiencies.

In addition to operational and output enhancing synergies, there are also sizable cost savings synergies. These include categories such as: (1) Selling, General, and Administrative (SG&A), and (2) procurement, supply chain, and logistics. FOF ¶ 27 (Mancini, Tr. 2768-69; Quinn, Tr. 2336-37; PX0010).

The estimated SG&A cost savings primarily result from the reduction in personnel and so-called "third party spend," i.e., contracts for third parties to provide needed services to the

combined company. FOF ¶ 222 (Mancini, Tr. 2773-75). Because the combination of two global organizations with corporate staffs causes "an enormous amount of overlap," the companies can eliminate much of that overlap and generate significant savings. FOF ¶ 222 (Mancini, Tr. 2773-75).

Tronox also expects cost saving from supply chain synergies, including volume purchase discounts. FOF ¶ 224 (Mancini, Tr. 2775-76). Both Tronox and Cristal purchase the same products at the scale of their respective businesses, while the combined entity will make those same purchases but at far greater volumes. FOF ¶ 224 (Mancini, Tr. 2775-76). Tronox expects that the combined company will obtain global supply agreements that will significantly reduce costs. FOF ¶ 224 (Mancini, Tr. 2775-76).

5. The Transaction's Synergies Have Been Validated By A Third Party.

Not only are these synergy estimates based on extensive due diligence by both Tronox and Cristal, but they have also been subject to third-party review. FOF ¶ 238 (Mancini, Tr. 2801). As explained, Tronox hired KPMG to verify the synergy estimates, specifically a team that specializes in synergy and assessment validation, which includes both operational and financial personnel, to look at Tronox's synergy estimates. FOF ¶¶ 241, 244 (Quinn, Tr. 2338-39; Mancini, Tr. 2802). After performing extensive review of the Tronox and Cristal transaction, with access to the "entire data room" in this matter, the KPMG synergy team provided Tronox with a report that "demonstrated [KPMG] had assessed and validated the synergies that [Tronox] had publicly communicated." FOF ¶¶ 246, 248 (Mancini, Tr. 2802-04). The banks that financed Tronox's transaction with Cristal required third-party validation of synergies and relied on the KPMG report to make their lending decisions with regard to the deal. FOF ¶ 241 (Quinn, Tr. 2338). KPMG permitted Tronox to share that report with its lenders. FOF ¶ 248 (Mancini, Tr. 2804).

6. Complaint Counsel's Efficiencies Analysis Does Not Refute The Substantial Synergies To Be Realized From the Transaction.

To refute Respondents' well-documented, transaction-specific efficiencies, Complaint Counsel relies solely on the testimony of its efficiencies expert, but Dr. Zmijewski's testimony cannot refute the synergies Respondents have identified. Dr. Zmijewski lacks the necessary and relevant expertise to evaluate the technical assessments that underlie Respondents' synergies, and in any event, he has expressed no opinion on the likelihood that any particular synergies will or will not come about. Dr. Zmijewski also offers no alternative analysis of the proposed synergies, including no alternative calculations estimations of what synergies are more likely.

Dr. Zmijewski admitted that he is not an expert in the TiO2 industry or TiO2 manufacturing process and that "[t]he extent of [his] knowledge regarding the operations in the TiO2 industry . . . is limited to documents [he] reviewed in this case." FOF ¶ 227 (Zmijewski, Tr. 1496). Nor is Dr. Zmijewski an expert in the technical operations at Tronox's or Cristal's pigment plants or the operation of any type of continuous-process chemical manufacturing plants, including TiO2 plants. FOF ¶ 228 (Zmijewski, Tr. 1493). In fact, Dr. Zmijewski has never *been* to a TiO2 pigment plant. FOF ¶ 228 (Zmijewski, Tr. 1529). He is "not qualified to evaluate the similarities or differences between Tronox's Hamilton plant and Cristal's Yanbu plant" from a technical or operational perspective. FOF ¶ 228 (Zmijewski, Tr. 1493-94).

Dr. Zmijewski also admitted that he has no expertise in chemical engineering, chemistry, metallurgy, or mining. FOF ¶ 229 (Zmijewski, Tr. 1493). He has no "technical or operational knowledge of how the Jazan facility works." FOF ¶ 229 (Zmijewski, Tr. 1494). In fact, Dr. Zmijewski testified that he does not have a basis to second-guess whether Tronox could, in fact, overcome the challenges it has identified with regard to operating the Jazan slagger. FOF ¶ 229 (Zmijewski, Tr. 1585).

Instead, Complaint Counsel has presented Dr. Zmijewski *only* as an expert in "accounting, economics, and finance, as they relate to financial analysis and valuation." FOF ¶ 230 (Zmijewski, Tr. 1492). As such, Dr. Zmijewski does not offer any opinion that the synergies Respondents claim will not occur. FOF ¶ 231 (Zmijewski, Tr. 1519). He offers no opinion as to whether: TiO2 output will increase post-transaction; the combined company's feedstock supply will expand; or cost-saving efficiencies will be realized. FOF ¶ 231 (Zmijewski, Tr. 1519). Dr. Zmijewski has not even evaluated whether KPMG's findings during its due diligence assessment are correct or not. FOF ¶ 232 (Zmijewski, Tr. 1552). Despite being an accounting, economics, and finance expert, Dr. Zmijewski did not even undertake any calculations of his own. FOF ¶ 236 (Zmijewski, Tr. 1519-20, 1570). He offered no "alternative calculation of efficiencies beyond what the Respondents have put forward." FOF ¶ 236 (Zmijewski, Tr. 1519).

Dr. Zmijewski has *only* offered his opinion that particular synergies are not "verifiable," by which he means that he has not "seen enough substantiation or a suitable methodology in the records available to [him] to say that the efficiency is verified according to [his] standards." FOF ¶ 234 (Zmijewski, Tr. 1505-06). Respectfully, that opinion is useless as a purported refutation of the projected synergies that Respondents have documented throughout this proceeding as evidence in the record and in testimony. Respondents operate a highly technical business that depends on expertise that Dr. Zmijewski does not possess, so it is irrelevant whether Respondents have put forward any substantiation or methodology that satisfies *Dr. Zmijewski's* lay understanding of how TiO2 manufacturing works.

E. Tronox Faces Intense And Growing Competition From Chinese Producers

Complaint Counsel ignores the most significant driver of change in the TiO2 industry: the rise of Chinese market entrants who are disrupting competition globally, including in North America. FOF ¶¶ 493, 496 (Stern, Tr. 3820; Turgeon, Tr. 2666-67; Romano, Tr. 2221-22). This

competition is good for consumers; it drives down prices. To compete in this new marketplace, producers like Defendants must improve by lowering their cost position. FOF ¶¶ 463, 103 (Quinn, Tr. 2318-19; RX0236; Arndt, Tr. 1422; Stern, Tr. 3704-05). This transaction is a key part of Defendants' ability to remain competitive. FOF ¶ 24 (Quinn, Tr. 2345-46; PX0010).

Contrary to the Complaint Counsel's assertions, the evidence shows that competition in the TiO2 industry is fierce and that the ongoing threat of low-cost production from Chinese rivals threatens both Tronox and Cristal. FOF ¶¶ 386, 513, 463 (Romano, Tr. 2238-39; [redacted]; Quinn, Tr. 2318-19; Christian, Tr. 887; Turgeon, Tr. 2610; Arndt, Tr. 1422; RX0236). Chinese producers—and one in particular, Lomon Billions—benefit from low labor costs and low capital costs. FOF ¶ 25 (Quinn, Tr. 2347). Some Lomon Billions products are already as good as or better than Tronox products and are capable of competing directly with them. FOF ¶¶ 386, 514 (Romano, Tr. 2238-39, 2244). The proposed transaction will allow the combined company to compete more effectively. FOF ¶ 21 (Quinn, Tr. 2324; PX0010).

Complaint Counsel wrongly dismisses the importance of Chinese TiO2 producers, particularly Lomon Billions, the fourth largest TiO2 supplier in the world by capacity. FOF ¶¶ 25, 484, 488 (Romano, Tr. 2243-44; Turgeon, Tr. 2659-60; Engle, Tr. 2492-93; RX0255; RX0171). The evidence clearly shows that Chinese producers are significant and fierce competitors globally in the North American TiO2 market and must be deemed, *at least*, to be "rapid entrants"—suppliers with "readily available 'swing' capacity currently used in adjacent markets that can easily and profitably be shifted to serve" North American customers. FOF ¶ 324 (RX1643; [redacted]). *See United States v. Falstaff Brewing Corp.*, 410 U.S. 526, 531-32 (1973) (recognizing the importance of entrants).

Chinese expansion in the TiO2 industry is real and unspeculative. Today, Lomon Billions is the fourth largest producer in the world, FOF ¶ 484 (Turgeon, Tr. 2659-60; Romano, Tr. 2243-44; Engle, Tr. 2493), and has the capacity to produce over 705,000 tons of TiO2 pigment, compared to Tronox's current global capacity of 465,000 tons, FOF ¶ 487 (Engle, Tr. 2491-92). By contrast, standalone Tronox is the world's sixth-largest TiO2 producer. FOF ¶ 23 (Quinn, Tr. 2345; PX0010). Recently, Lomon Billions publicly announced plans to expand its chloride capacity, including by adding 200,000 tons per year during the year 2019 (nearly as much capacity as Tronox's entire Hamilton facility) and 300,000 tons per year sometime in the mid-2020s, amounting to an additional 500,000 tons of chloride capacity. FOF ¶¶ 473, 516 (Engle, Tr. 2498-99; Stern, Tr. 3781; Romano, Tr. 2244-45). Lomon Billions has announced expansion plans for its total capacity, publicly stating that it intends to become the world's largest producer of TiO2 pigment capacity of 1.3 million tons by mid-2020s. FOF ¶¶ 487 (RX1642; Engle, Tr. 2493; *see also* Stern Figure 8, RX0171). Customers and producers alike have been put on notice about Lomon Billions' substantial chloride TiO2 expansions. FOF ¶¶ 25, 467, 528 (Quinn, Tr. 2347; Mouland, Tr. 1209; [redacted]). Chinese producers are vigorously expanding their presence in the global and North American TiO2 market, even seeking to "dominate" the TiO2 industry. FOF ¶ 25 (Quinn, Tr. 2347). They benefit from low capital costs, support from the Chinese government, and from inherited intellectual property. FOF ¶ 25 (Quinn, Tr. 2347).

Evidence presented at trial also showed that Chinese producers are already an active competitive force in the global TiO2 market, using swing capacity to respond rapidly to supply shortfalls around the world. FOF ¶¶ 480-81 (Romano, Tr. 2221-22). For example, after Venator's TiO2 plant in Pori, Finland shut down due to fire, the large gap in supply in Europe caused by the Pori plant fire was filled by a rapid increase of exports from China into Europe. FOF ¶¶ 324, 507

[redacted]

* * *

For the foregoing reasons, Complaint Counsel has failed to meet its burden to show that the Tronox-Cristal transaction will harm consumers. The complaint should be dismissed with prejudice.

Dated: August 7, 2018

Submitted By:

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CERTIFICATE OF SERVICE

I hereby certify that on August 8, 2018, I filed the foregoing document electronically using the FTC's E-Filing System, which will send notification of such filing to:

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CERTIFICATE FOR ELECTRONIC FILING

I certify that the electronic copy sent to the Secretary of the Commission is a true and correct copy of the paper original and that I possess a paper original of the signed document that is available for review by the parties and the adjudicator.

August 8, 2018

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Notice of Electronic Service

I hereby certify that on August 08, 2018, I filed an electronic copy of the foregoing Respondents' Post-Trial Brief, with:

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