UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

Form 10-K

(Mark One)

☒ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the Year ended December 31, 2020
OR

☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from to

1-35573

(Commission file number)

TRONOX HOLDINGS PLC

(Exact name of registrant as specified in its charter)

England and Wales	98-1467236
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

263 Tresser Boulevard, Suite 1100 Stamford Connecticut 06901	Laporte Road, Stallingborough Grimsby, North East Lincolnshire, DN40 2PR United Kingdom

Registrant’s telephone number, including area code: (203) 705-3800

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
Ordinary Shares, par value $0.01 per share	New York Stock Exchange

Trading Symbol: TROX

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☒ No ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act. Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of “large accelerated filer,” “accelerated filer,” “smaller reporting company” and “emerging growth company” in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☐	Accelerated filer	☒
Non-accelerated filer	☐	Smaller reporting company	☐
Emerging growth company	☐		

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

The aggregate market value of the ordinary shares held by non-affiliates of the registrant as of June 30, 2020 was approximately $658,566,488.

Indicate by check mark whether the registrant has filed all documents and reports required to be filed by Section 12, 13 or 15(d) of the Securities Exchange Act of 1934 subsequent to the distribution of securities under a plan confirmed by a court. Yes ☒ No ☐

As of January 31, 2021, the registrant had 143,557,479 ordinary shares outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant’s proxy statement for its 2021 annual general meeting of shareholders are incorporated by reference in this Form 10-K in response to Part III Items 10, 11, 12, 13 and 14.

TRONOX HOLDINGS PLC
ANNUAL REPORT ON FORM 10-K
FOR THE FISCAL YEAR ENDED DECEMBER 31, 2020
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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

We have made statements under the captions “Business,” “Risk Factors,” “Management’s Discussion and Analysis of Financial Condition and Results of Operations”, and in other sections of this Form 10-K that are forward-looking statements. Forward-looking statements also can be identified by words such as “future,” “anticipates,” “believes,” “estimates,” “expects,” “intends,” “plans,” “predicts,” “will,” “would,” “could,” “can,” “may,” and similar terms. These forward-looking statements, which are subject to known and unknown risks, uncertainties and assumptions about us, may include projections of our future financial performance based on our growth strategies and anticipated trends in our business. These statements are only predictions based on our current expectations and projections about future events. There are important factors that could cause our actual results, level of activity, performance or achievements to differ materially from the results, level of activity, performance or achievements expressed or implied by the forward-looking statements. In particular, you should consider the numerous risks and uncertainties outlined in “Risk Factors.”

These risks and uncertainties are not exhaustive. Other sections of this Form 10-K may include additional factors, which could adversely impact our business and financial performance. Moreover, we operate in a very competitive and rapidly changing environment. New risks and uncertainties emerge from time to time, and it is not possible for our management to predict all risks and uncertainties, nor can management assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements.

Although we believe the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee future results, level of activity, performance or achievements. Moreover, neither we nor any other person assumes responsibility for the accuracy or completeness of any of these forward-looking statements. You should not rely upon forward-looking statements as predictions of future events. Unless otherwise required by applicable law, we are under no duty to update any of these forward-looking statements after the date of this Form 10-K to conform our prior statements to actual results or revised expectations and we do not intend to do so.

When considering forward-looking statements, you should keep in mind the risks, uncertainties and other cautionary statements made in this Form 10-K and the documents incorporated by reference, including, in particular, the factors discussed below. These factors may be revised or supplemented in subsequent reports on Forms 10-Q and 8-K.

Factors that may affect future results include, but are not limited to:

- the risk that our customers might reduce demand for our products;
- market conditions and price volatility for titanium dioxide (“TiO2”), zircon and other feedstock products, as well as global and regional economic downturns, that adversely affect the demand for our end-use products;
- potential risks and uncertainties relating to the ultimate geographic spread of COVID-19, the severity of the disease and the effectiveness of treatments and vaccines and the duration of the COVID-19 outbreak, including potential material adverse effects on our business, financial condition and results of operations;
- actions that may be taken by governmental authorities to contain the COVID-19 outbreak or to treat its impact on our business, including the failure to implement additional stimuli;
- the potential negative impacts of COVID-19 on the global economy and financial markets;
- the possibility that Chinese production of chloride technology and improvements in product quality may occur more quickly than anticipated;
- changes in prices or supply of energy or other raw materials;
- liability, production delays and additional expenses from environmental and industrial accidents;
- production curtailments, shutdowns or additional expenditures resulting from equipment upgrades, equipment failures and deterioration of assets;
- the possibility that cybersecurity incidents or other security breaches may seriously impact our results of operations and financial condition;
- risks of operating a global business;
- political and social instability, and unrest, in the Middle East region;
- economic conditions and regulatory changes following the U.K.'s exit from the E.U. could adversely impact our operations, operating results and financial condition;
- fluctuations in currency exchange rates;

- the risk that the agreements governing our debt may restrict our ability to operate our business in certain ways, as well as impact our liquidity;
- our inability to obtain additional capital on favorable terms;
- the risk that we may not realize expected investment returns on our capital expenditure projects;
- an unpredictable regulatory environment in South Africa where we have significant mining and beneficiation operations, including amendments by the South African Department of Mineral Resources to the Mining Charter;
- unanticipated costs or liabilities, including the classification of TiO2 as a Category 2 Carcinogen in the E.U., as a result of compliance with, or claims under environmental, health and safety regulations;
- the risk that our ability to use our tax attributes to offset future income may be limited;
- concentrated share ownership in the hands of Cristal and Exxaro Resources Limited (“Exxaro”), which may result in conflicts of interest and/or prevent minority shareholders from influencing the Company; and
- impact of English law and our articles of association on our ability to manage our capital structure flexibly and the anti-takeover protections incorporated into our articles of association.

We are committed to providing timely and accurate information to the investing public, consistent with our legal and regulatory obligations. To that end, we use our website to convey information about our businesses, including the anticipated release of quarterly financial results, quarterly financial and statistical and business-related information. Investors can access announcements about the Company through our website available at *http://www.tronox.com*. Our website is included as an inactive textual reference only and the information contained therein or connected thereto shall not be deemed to be incorporated into this Form 10-K.

PART I

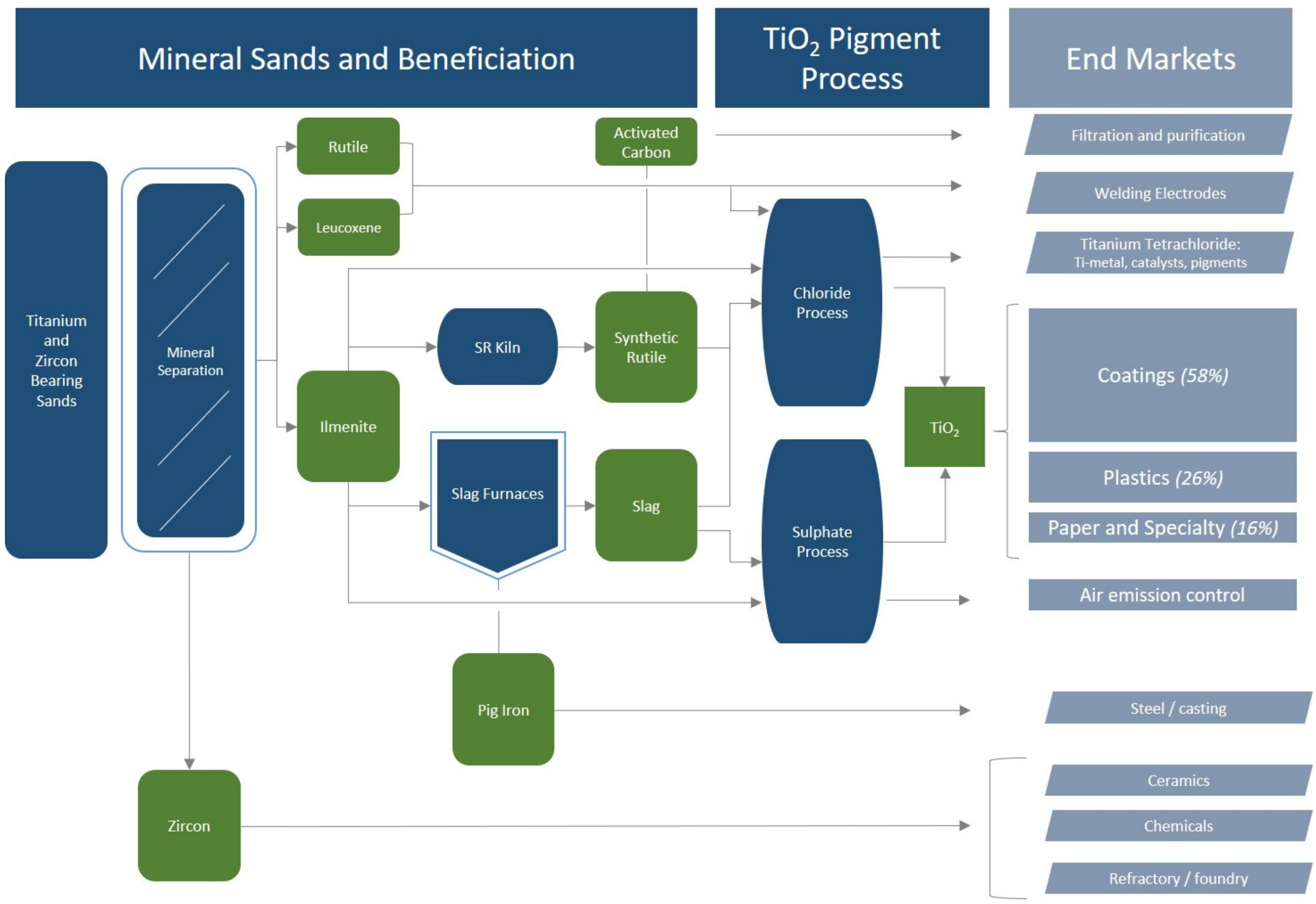
For the purposes of this discussion, references to "we," "us," and, "our" refer to Tronox Holdings plc, together with its consolidated subsidiaries (collectively referred to as "Tronox" or the "Company"). We are a public limited company formed under the laws of England and Wales. We are considered a domestic company in the United Kingdom and, as such, are required to comply with filing requirements in the United Kingdom. Additionally, we are not considered a "foreign private issuer" in the U.S.; therefore, we are required to comply with the reporting and other requirements imposed by the U.S. securities law on U.S. domestic issuers, which, among other things, requires reporting under accounting principles generally accepted in the United States of America ("U.S. GAAP").

Item 1. Business

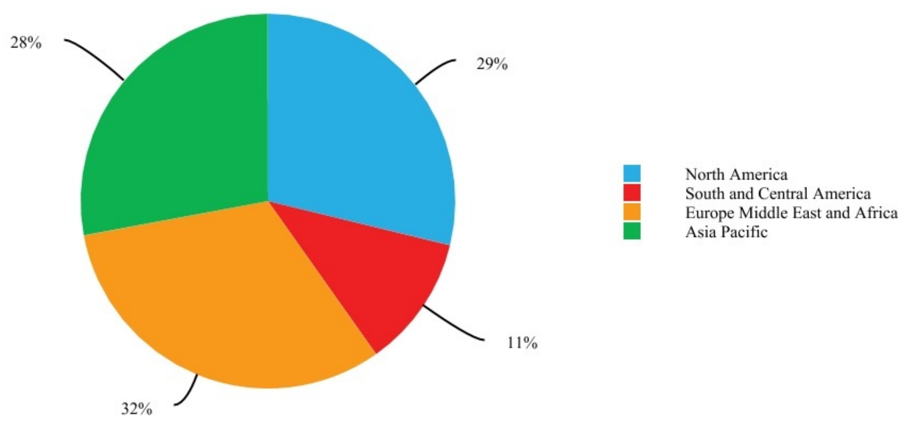
Overview

Tronox is the world's leading vertically integrated manufacturer of TiO_2 pigment. We operate titanium-bearing mineral sand mines and beneficiation and smelting operations in Australia, South Africa and Brazil to produce feedstock materials that can be processed into TiO_2 for pigment, high purity titanium chemicals, including titanium tetrachloride, and ultrafine TiO_2 used in certain specialty applications. It is our long-term strategic goal to be vertically integrated and consume all our feedstock materials in our 9 TiO_2 pigment facilities located in the United States, Australia, Brazil, UK, France, the Netherlands, China and the Kingdom of Saudi Arabia ("KSA"). We believe that vertical integration is the best way to achieve our ultimate goal of delivering low cost, high-quality pigment to our approximately 1,200 TiO_2 customers throughout the world. The mining, beneficiation and smelting of titanium bearing mineral sands also creates meaningful quantities of zircon, which we also supply to customers around the world.

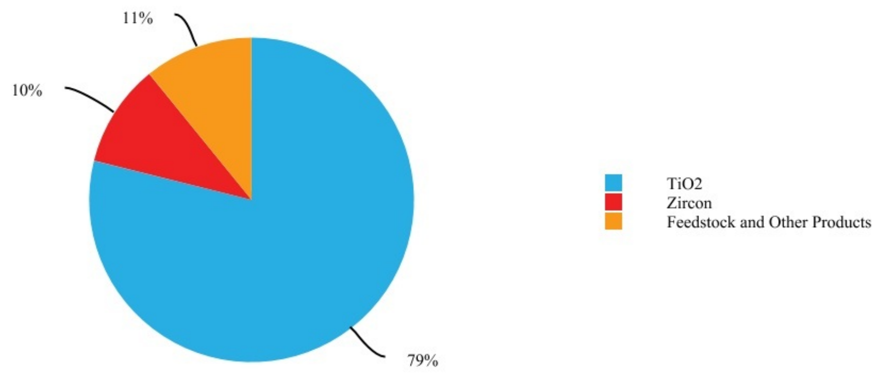
The following chart highlights the TiO_2 value chain we participate in (percentages set forth in the chart below refer to the global TiO_2 market as of December 31, 2020):



The following sets forth the percentage of our revenue derived from sales of our products by geographic region for the year ended December 31, 2020.



The below sets forth the percentage of our revenue derived from sales of our products for the year ended December 31, 2020.



For further financial information regarding our products and geographic regions, see the section entitled "Management's Discussion and Analysis of Financial Condition and Results of Operations", as well as Notes 5 and 25 of notes to our consolidated financial statements, each included elsewhere in this Form 10-K.

2020 Key Strategic Initiatives

The following sets forth the key strategic initiatives undertaken during 2020:

Become the Low Cost TiO_2 Producer by Investing in our Business Processes

Our ability to compete effectively in the TiO_2 industry is determined by many factors, including innovation, reliability, product quality, customer service and price. The business processes that allows us to maximize the benefit of our vertical integration and global footprint --- the so-called “hidden factory” --- needs to be optimized if we are to successfully meet the pricing and other competitive pressures that characterize our industry. One of the largest investment projects that we have embarked on to improve our global business processes is what we call “Project newTron,” a multi-year IT-enabled transformation program that includes both operational and business transformation. We believe that Project newTron will not only enable us to maintain our position as among the lowest cost producers of TiO_2 but also substantially improve the reliability, customer service, cybersecurity and the IT resiliency of our operations.

Improve our Contracting Terms to Offer Our Customers More Predictability Through Margin Stabilization

Our TiO_2 sales and marketing efforts are focused on strengthening our margin stabilization program which we regard as a core pillar of our strategy to better serve the paint and coatings industry. Customers who chose to participate in our margin stabilization program are provided with relative certainty over availability of product and price stability that allows us to focus on predictability and reliability of TiO_2 delivery across the supply and demand cycle. We believe that margin stabilization is a “win-win” proposition allowing our customers to reduce volatility in their supply chains and allowing Tronox to consistently invest in its mines, upgrading facilities and TiO_2 plants throughout the supply-demand cycle.

Strengthening Vertical Integration

In order to become the world’s leading vertically integrated producer of TiO_2, one of our capital allocation priorities is to develop sufficient titanium feedstock production capacity to meet the needs of growing global demand for TiO_2. We are pursuing feedstock production growth through both organic and inorganic means.

In terms of organic growth, we have two significant projects currently underway. One is the development of a mine in Eastern Australia known as Atlas Campaspe and the other is the commissioning of a titatnium slag smelter majority-owned by a subsidiary of our largest shareholder, Tasnee, where we have extended a $125 million loan and are contributing know-how and technology services. Atlas Campaspe is intended to replace feedstock supply from our existing Snapper / Ginkgo mines which are nearing end of life. Our pre-mining feasibility work indicates that this mine is abundant in natural rutile and high-value zircon, and will be a significant source of high grade ilmenite suitable for direct use, synthetic rutile production, or slag processing. We have significant other mine development projects in earlier stages of development in Western Australia and on the Eastern Cape of South Africa.

A second significant organic growth project is a titanium slag smelter facility (the “Slagger”) located in The Jazan City for Primary and Downstream Industries in KSA. On May 9, 2018, we entered into an Option Agreement with Advanced Metals Industries Cluster Company Limited (“AMIC”) which is owned equally by Tasnee and Cristal. Under the terms of the Option Agreement, AMIC granted us an option (the “Option”) to acquire 90% of a special purpose vehicle (the “SPV”) which will hold AMIC’s ownership in the Slagger. The Option may be exercised if the Slagger achieves certain production criteria related to sustained quality and tonnage of slag produced (the “Option Criteria”). Likewise, AMIC may require us to acquire the Slagger on the same terms if the Option Criteria are satisfied (the “Put”). If the Option Criteria are met and Cristal exercises the Put or we exercise the Option, AMIC will also contribute $322 million of AMIC indebtedness (the “AMIC Debt”) to the SPV before we acquire a 90% ownership in it. In addition pursuant to the Option Agreement, we agreed to lend AMIC up to $125 million for capital expenditures and operational expenses intended to facilitate the start-up of the Slagger (the “Tronox Loans”). As of December 31, 2020, we have loaned AMIC $125 million to facilitate the startup of the Slagger. If the Option Criteria are met and Cristal exercises the Put or we exercise the Option, AMIC will also contribute the Tronox Loans to the SPV before we acquire a 90% ownership in it.

On May 13, 2020, we amended the Option Agreement (the "First Amendment") with AMIC to address circumstances in which the Option Criteria fail to be satisfied. Pursuant to the First Amendment, if the Option Criteria are not satisfied, Tronox has the right to acquire 90% of the SPV in exchange for the forgiveness of the Tronox Loans in which case the AMIC Debt will be retained by AMIC and not contributed to the SPV.

Additionally, on May 13, 2020, we amended a Technical Services Agreement (the “Amended TSA”) that we had entered with AMIC on March 15, 2018 to supplement certain technical services that we had originally agreed to provide. Under the Amended TSA, we agreed to provide technical advice and project management services including supervision and management of third party consultants intended to increase the likelihood that the Option Criteria are satisfied. AMIC and its consultants remain responsible for engineering and construction of the Slagger. As compensation for these services, Tronox receives a monthly management fee of approximately $1 million, subject to certain success incentives if and when the Slagger achieves the Option Criteria.

We are also pursuing on an inorganic basis, opportunities to increase our production of titanium feedstocks. In May 2020, we announced the signing of a definitive agreement to acquire the Tizir Titanium and Iron ("TTI") business from Eramet S.A. for approximately $300 million in cash. TTI is a titanium smelter or slagger located in Tyssedal, Norway which upgrades ilmenite to produce high-grade titanium slag and high-purity pig iron. However, on January 18, 2021, we terminated our agreement with Eramet and paid a $18 million break-fee following the United Kingdom Competition and Markets Authority opening of a phase 2 investigation into the proposed TTI acquisition.

Tronox Synergy Savings Program

On April 10, 2019, we completed the acquisition (the "Cristal Transaction") from National Industrialization Company (“Tasnee”) of the TiO_2 business of The National Titanium Dioxide Company Ltd., a limited company organized under the laws of the Kingdom of Saudi Arabia (“Cristal”). The Cristal Transaction created significant opportunities for us to realize operating and cost-saving synergies. When the Cristal Transaction closed, we announced our goal of achieving approximately $220 million in synergies by 2022. For the year ended December 31, 2020, we delivered total synergies of $243 million, of which $193 million have been reflected in our EBITDA and $50 million are cash and other synergies not reflected in EBITDA.

Our Principal Products

TiO_2

TiO_2 Pigment

TiO_2 pigment is used in a wide range of products due to its ability to impart whiteness, brightness, and opacity. TiO_2 pigment is used extensively in the manufacture of paint and other coatings, plastics and paper, and in a wide range of other applications. Moreover, it is a critical component of everyday consumer applications due to its superior ability to cover or mask other materials effectively and efficiently relative to alternative white pigments and extenders. TiO_2 pigment is considered to be a quality of life product. At present, it is our belief that there is no effective substitute for TiO_2 pigment because no other white pigment has the physical properties for achieving comparable opacity and brightness or can be incorporated as cost effectively.

Ultrafine Specialty TiO_2

We use the sulfate process at our manufacturing facility in Thann, France to produce ultrafine TiO_2 products. We market ultrafine TiO_2 products under the CristalActiv® trademark. Ultrafine TiO_2 has highly catalytic properties due to the relatively high surface area of each TiO_2 molecule. The principal use of ultrafine TiO_2 products is in NOx emission control products utilized in stationary, mobile and marine applications.

In 2020, we generated $2.2 billion in revenue from sales of TiO_2.

Zircon

Zircon (ZrSiO4) is a co-product of mining mineral sands deposits for titanium feedstock. Zircon is primarily used as an additive in ceramic glazes, which makes the ceramic glaze more water, chemical and abrasion resistant. It is also used for the production of zirconium metal and zirconium chemicals, in refractories, as molding sand in foundries, and for TV screen glass, where it adds its structural stability at high temperatures and resistance to abrasive and corrosive conditions. Zircon typically represents a relatively low proportion of the in-situ heavy mineral sands deposits we mine, but has a relatively high value compared to other heavy mineral products. Refractories containing zircon are expensive and are only used in demanding, high-wear and corrosive applications in the glass, steel and cement industries. Foundry applications use zircon when casting articles of high quality and value where accurate sizing is crucial, such as aerospace, automotive, medical, and other high-end applications.

In 2020, we generated $283 million in revenue from sales of zircon.

Feedstock and Other Products

High Purity Pig Iron

During the process of smelting ilmenite at our smelters to increase the concentration of titanium and produce titanium slag, high purity pig iron is produced as a co-product. High purity pig iron is used as a raw material in foundries for the production of high-quality ductile iron castings. Ductile iron is used extensively throughout the world for the production of safety critical automotive parts, such as engine blocks, brake calipers and steering knuckles in cars and trucks.

Feedstock

Most TiO_2 products are derived from three naturally occurring minerals which are commonly referred to as heavy minerals or mineral sands: ilmenite, leucoxene and rutile. Ilmenite, rutile, leucoxene, as well as titanium slag and synthetic rutile which are processed from ilmenite, are the primary feedstock materials that we use for the production of TiO_2 pigment. Titanium slag is produced by smelting ilmenite in an electric arc furnace to separate titanium-oxide from the iron and other impurities. Synthetic rutile is produced by reducing ilmenite in a rotary kiln, followed by leaching under various conditions to remove the metallic iron from the reduced ilmenite grains. The purpose of both processes is to increase the titanium concentration of the ilmenite. There is substantial overlap amongst each of the aforementioned with the primary differentiating factor being the level of titanium content. For instance, rutile has the highest titanium dioxide content of approximately 94% to 96%, while ilmenite has the lowest of approximately 45% to 65%. As a result of expiration of external feedstock agreements entered into in connection with the regulatory approval of our Cristal transaction and our continued pursuit of our vertical integration strategy, we expect revenue associated with the sales of feedstock will significantly decline going forward.

Titanium Tetrachloride

We sell titanium tetrachloride (“$TiCl_4$”) from our facilities in Thann, France and Yanbu, KSA. At our Thann facility in France, we produce $TiCl_4$ dedicated for sale to customers for use mainly in the production of various types of pigments and catalyst products. At our Yanbu facility, we produce excess $TiCl_4$ which we sell directly to a joint venture between Advanced Metal Industries Cluster and Toho Titanium Metal Co. Ltd. ("ATTM") for use at a titanium sponge plant facility that is adjacent to our Yanbu facility.

In 2020, we generated $299 million in revenue from the sale of high purity pig iron, feedstock, titanium tetrachloride and other products. This amount also includes revenue generated from the 8120 paper laminate grade to Venator Materials plc ("Venator"). In 2019, as part of the Cristal Transaction and in order to obtain approval by regulators in the European Union, we sold the 8120 paper laminate grade to Venator and entered into a three-year transitional supply agreement which will likely terminate in April 2022. Revenue from 8120 paper laminate grade sales to Venator are included within Feedstock and Other products until the expiration date of the supply agreement with Venator.

The demand for certain of our products during a given year is subject to seasonal fluctuations. See “Risk Factors – Risks Relating to our Business - The markets for many of our products have seasonally affected sales patterns”.

Mining and Beneficiation of Mineral Sands Deposits

Our current operational mining and beneficiation of mineral sands deposits are comprised of the following:

- KwaZulu-Natal (“KZN”) Sands operations located on the eastern coast of South Africa consisting of the Fairbreeze mine, a concentration plant, a mineral separation plant and two smelting furnaces that produce titanium slag;
- Our Namakwa Sands operations located on the western coast of South Africa consisting of the Namakwa mine, two concentration plants, a mineral separation plant, as well as two smelting furnaces that produce titanium slag;
- Our Northern Operations complex in Western Australia consisting of the Cooljarloo dredge mine and floating heavy mineral concentration plant and the Chandala metallurgical site which includes a mineral separation plant and a synthetic rutile plant that produces synthetic rutile;
- Our Murray Basin operations in New South Wales, Australia consisting of the Ginkgo and Snapper mines, a floating heavy mineral concentration plant at the Ginkgo site, and a mineral separation plant;
- Our Perth Basin operations in Western Australia consisting of the Wonnerup mine and a mineral separation plant; and
- Our Paraiba, Brazil mining operations ceased during 2020 in line with our life of mine plan; however, we believe there is enough feedstock to supply the Brazil pigment plant through 2022.

Zircon is often, but not always, found in mineral sands deposits containing ilmenite. It is extracted, alongside ilmenite and rutile, as part of the initial mineral sands beneficiation process.

The mining of mineral sands deposits is conducted either “wet,” by dredging or hydraulic water jets, or “dry,” by using earth-moving equipment to excavate and transport the sands. The type of mining operation we deploy is dependent upon the characteristics of the ore body. Dredge mining is generally the favored method of mining mineral sands, provided that the ground conditions are suitable, water is readily available and the deposit is low in slime content. Dry mining techniques are generally preferred in situations involving hard ground, discontinuous ore bodies, small tonnage, high slimes contents and/or very high grades.

Regardless of the type of mining technique, the first step in the beneficiation process after the mineral sands have been mined is to utilize wet concentrator plants to produce a high grade of heavy mineral concentrate (typically approximately 90% to 98% heavy mineral content). Screened ore is first de-slimed, a process by which slimes are separated from larger particles of minerals, and then processed through a series of spiral separators that use gravity to separate the heavy mineral sands from lighter materials, such as quartz. Residue from the concentration process is pumped back into either the open pits or slimes dams for rehabilitation and water recovery.

After producing heavy mineral concentrate in our wet concentrator plants, we separate the non-magnetic (zircon and rutile) and magnetic (ilmenite) fractions utilizing a variety of techniques. Through the separation process, we produce zircon which is sold directly to customers and rutile and leuxocene which can immediately be used as feedstock material to make TiO_2 pigment or sold to the titanium metal, welding and other industries.

Ilmenite is generally further refined for use in our TiO_2 pigment manufacturing processes. Depending on the characteristics of the ilmenite we use two fundamental processes to refine ilmenite. Both processes involve the removal of iron and other non-titanium material.

- Titanium slag is made by smelting ilmenite in an electric arc furnace to separate titanium-oxide from the iron and other impurities. The result is two products: "slag" which contains 86% to 89% titanium dioxide and is considered a TiO_2 feedstock material, and high purity pig iron which is ready for sale to end-use customers.

- Synthetic rutile is made by reducing ilmenite in a rotary kiln, followed by leaching under various conditions to remove the iron from the reduced ilmenite grains. Activated carbon is a byproduct of this process. Our synthetic rutile has a titanium dioxide content of approximately 89% to 92% and is also considered a TiO_2 feedstock material.

Our current mining and beneficiation operations have an annual production capacity of approximately 822,000 metric tons ("MT") of titanium feedstock, which is comprised of 182,000 MT of rutile and leucoxene, 230,000 MT of synthetic rutile and 410,000 MT of titanium slag. We currently have the capability to produce approximately 297,000 MT of zircon and 220,000 MT of pig iron.

Competitive Conditions of Mining and Feedstock Production

Globally, there are a large number of mining companies that mine mineral sand deposits containing ilmenite, as well as zircon. However, there is a smaller number of mining companies that are also involved in upgrading the underlying ilmenite to produce feedstock typically utilized by TiO_2 producers.

Pigment producers procure a range of types of feedstocks from multiple feedstock producers to create varying blends of feedstock materials that maximize the efficiency and economic returns of their unique production technique under conditions applicable at the time of production. Pigment producers frequently switch the relative amount of each feedstock they procure based on a number of factors including: the relative cost of feedstocks, feedstock logistics costs, the cost of, and availability of, chemicals used to process feedstocks, as well as waste management costs. Hence, there is a high degree of substitutability between and among titanium feedstocks.

Production of TiO_2 Pigment

TiO_2 pigment is produced using a combination of processes involving the manufacture of base pigment particles through either the chloride or sulfate process followed by surface treatment, drying and milling (collectively known as finishing). Currently, approximately 87% of our TiO_2 pigment production capacity is produced using the chloride process and approximately 13% of our TiO_2 production capacity is produced using the sulfate process.

In the chloride process, feedstock (slag, synthetic rutile, natural rutile or ilmenite ores) are reacted with chlorine (the chlorination step) and carbon to form $TiCl_4$ in a continuous fluid bed reactor. Purification of $TiCl_4$ to remove impurities is accomplished using selective condensation and distillation processes. The purified $TiCl_4$ is then oxidized in a vapor phase form to produce raw pigment particles and chlorine gas. The latter is recycled back to the chlorination step for reuse. Raw pigment is then typically slurried with water and dispersants prior to entering the finishing step. Due to the nature of the production process, the final pigment product is not sensitive to the feedstocks used to create it, as substantially all substances other than TiO_2 are removed during the process. The chloride process currently accounts for substantially all of the industry-wide TiO_2 production capacity in North America, and approximately 43% of industry-wide capacity globally.

In the sulfate process, ilmenite and/or slag are dissolved in concentrated sulfuric acid. After removing impurities, dissolved titanium is hydrolyzed and separated from the remaining sulfuric acid. The titanium hydrolysate is subsequently calcined in a rotary kiln to produce a raw TiO_2. The product is then further finished in a similar way to TiO_2 produced through the chloride process.

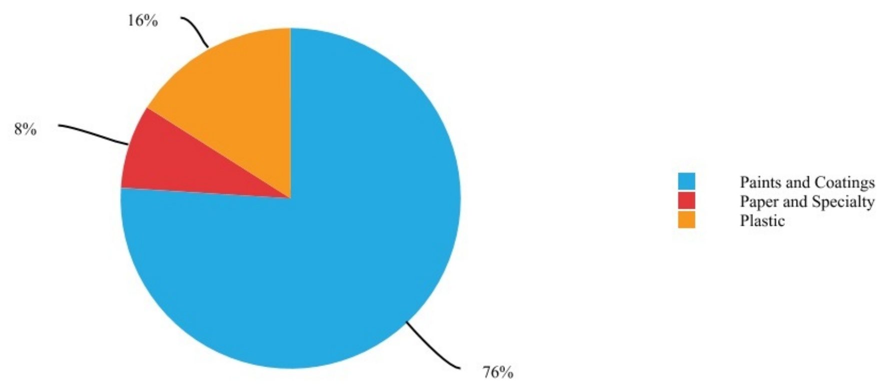
Commercial production of TiO_2 pigment results in one of two different crystal forms: rutile, which is manufactured using either the chloride process or the sulfate process, or anatase, which is only produced using the sulfate process. Rutile TiO_2 is preferred over anatase TiO_2 for many of the largest end-use applications, such as coatings and plastics, because its higher refractive index imparts better hiding power at lower quantities than the anatase crystal form and it is more suitable for outdoor use because it is more durable. Rutile TiO_2 can be produced using either the chloride process or the sulfate process.

The primary raw materials used in the production of chloride TiO_2 pigment include titanium feedstock, chlorine and coke. As discussed above, we believe we are unique in the degree to which we produce our own high-grade titanium feedstock. Other chemicals used in the production of TiO_2 are purchased from various companies under short and long-term supply contracts. In the past, we have been, and we expect that we will continue to be, successful in obtaining extensions to these and other existing supply contracts prior to their expiration. We expect the raw materials purchased under these contracts, and contracts that we enter into the near term, to meet our requirements over the next several years.

Marketing of TiO_2

We supply and market TiO_2 under the brand name TIONA® and CristalActiv® to approximately 1,200 customers in approximately 120 countries, including market leaders in each of the key end-use markets for TiO_2, and we have supplied each of our top ten customers with TiO_2 for more than 10 years. In 2018, we launched a margin stabilization program which is a key part of our TiO_2 marketing and sales strategy. Customers who chose to participate in our margin stabilization program are provided with relative certainty over availability of product and price stability that allows us to focus on predictability and reliability of TiO_2 delivery across the supply and demand cycle.

The following sets forth the percentage of our TiO_2 sales volume by end-use market for the year ended December 31, 2020:



In addition to price and product quality, we compete on the basis of technical support and customer service. We sell our products through both a direct sales force and third-party agents and distributors. Our direct sales, marketing and technical service organizations execute our sales and marketing strategy on a global basis. Due to the technical requirements of TiO_2 applications, our technical service organization and direct sales offices are supported by a regional customer service staff located in each of our major geographic markets.

Our sales and marketing strategy focuses on aligning ourselves with customers growing faster than the market and effective customer management through the development and maintenance of strong relationships. We develop customer relationships and manage customer contact across multiple contact points within the organization including our sales, technical service and marketing, research and development, and customer service teams. These primary points of contact are supplemented by direct contact with plant operations personnel, supply chain specialists, and senior management. We believe that multiple points of customer contact facilitate efficient problem solving, supply chain support, formula optimization and co-development of products.

Competitive Conditions of TiO_2 Pigment

The global market in which our TiO_2 pigment business operates is highly competitive. Competition is based on a number of factors such as price, product quality and service. We face competition from both chloride process pigment producers and sulfate process pigment producers. Moreover, because transportation costs are minor relative to the cost of our product, there is also competition between products produced in one region versus products produced in another region.

We face competition from global competitors with headquarters in Europe, the United States and China, including Chemours, Lomon Billions, Venator, Kronos Worldwide Inc., and INEOS. In addition, we compete with numerous regional producers particularly in Eastern Europe and China.

Research and Development

We have research and development facilities that aim to develop new products, service our products, and focus on applied research and development of both new and existing processes. We utilize a third party for research and development support with respect to our mineral sands business located in South Africa and Australia. The majority of scientists supporting our TiO_2 pigment product development and testing are located in Oklahoma City, Oklahoma, USA and Stallingborough, UK, while the majority of scientists supporting our TiO_2 ultrafine specialty business are located in Thann, France.

New process developments are focused on increased throughput, efficiency gains and general processing-related improvements for our customers. Ongoing development of process technology contributes to cost reduction, enhanced production flexibility, increased capacity, and improved consistency of product quality. In 2020, our product development and commercialization efforts were focused on launching several new TiO_2 products that we believe will deliver added value to customers in plastics end use segments by way of enhanced properties of the pigment. In addition, our development efforts continued on multiple new products that we believe should deliver better performance to customers across all end use segments.

Patents, Trademarks, Trade Secrets and Other Intellectual Property Rights

Protection of our proprietary intellectual property is important to our business. At December 31, 2020, we held 118 patents and 7 patent applications in the U.S., and approximately 698 in foreign counterparts, including both issued patents and pending patent applications. Our U.S. patents have expiration dates ranging through 2039. Additionally, we have 9 trademark registrations in the U.S. and 2 trademark applications in the U.S., as well as 251 trademark counterpart registrations and applications in foreign jurisdictions.

We also rely upon our unpatented proprietary technology, know-how and other trade secrets. The substantial majority of our patents and trade secrets relate to our chloride products, surface treatments, chlorination expertise, and oxidation process technology, and this proprietary chloride production technology is an important part of our overall technology position. However, much of the fundamental intellectual property associated with both chloride and sulfate pigment production is no longer subject to patent protection. At Namakwa Sands, we rely on intellectual property for our smelting technology, which was granted to us in perpetuity by Anglo American South Africa Limited for use on a worldwide basis, pursuant to a non-exclusive license.

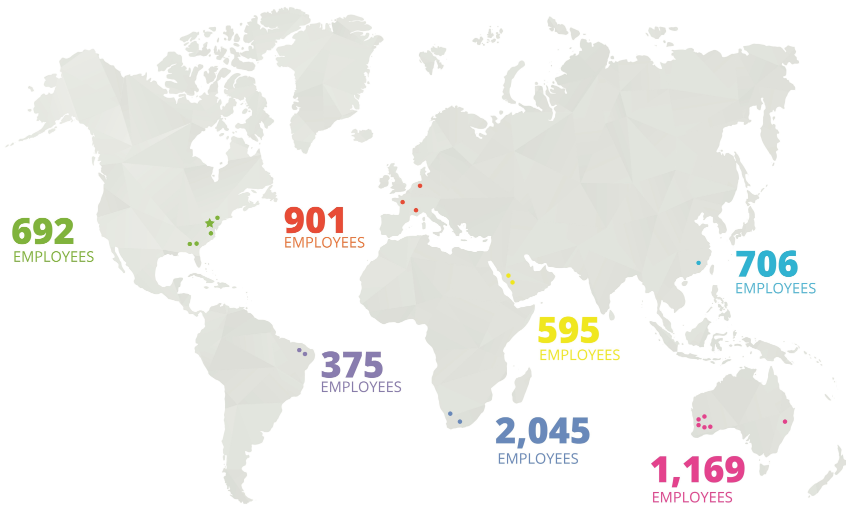
While certain of our patents relating to our products and production processes are important to our long-term success, more important is the operational knowledge we possess. We also use and rely upon unpatented proprietary knowledge, continuing technological innovation and other trade secrets to develop and maintain our competitive position. We conduct research activities and protect the confidentiality of our trade secrets through reasonable measures, including confidentiality agreements and security procedures. We protect the trademarks that we use in connection with the products we manufacture and sell, and have developed value in connection with our long-term use of our trademarks. See “Risk Factors—If our intellectual property were compromised or copied by competitors, or if competitors were to develop similar intellectual property, our results of operations could be negatively affected. Further, third parties may claim that we infringe on their intellectual property rights which could result in costly litigation."

Human Capital

Tronox employs approximately 6,500 people across six continents, and we believe it is our rich diversity and exceptional operational and technical expertise that, combined with our vertical integration model, position Tronox as the world's leading vertically integrated manufacturer of titanium dioxide pigment. Recognizing the importance of our human capital, we have made People, Culture and Capabilities one of our five strategic pillars, and placed a priority around developing leaders who will help us effectively (i) acquire, develop and nurture our talent, and (ii) foster a culture with the values that are important to us, starting with safety and an outward mindset.

People

Because we operate both titanium ore mines and titanium dioxide pigment plants, and because our operations span the world, we not only require specialty skills in mining and TiO_2 pigment manufacturing, but we also need people who are willing to learn skills across both operations and who can help us extract value from our integrated model. The below map sets forth the approximate number of employees as of December 31, 2020, in each of the global regions in which we operate.



Accordingly, we place a high priority on knowledge transfer (including by relocating skilled leaders across countries and between mining and TiO_2 pigment operations, by staffing high-potential employees in regions on global projects, and by enabling collaboration in global centers of excellence), and we place a high priority on fostering diversity and inclusion. We are committed to creating an organization where leaders foster and encourage a diverse workforce, where people feel valued and respected, have access to opportunities, and in which a variety of different voices are encouraged and heard.

We also place an uncompromising focus on operating safe, reliable, and responsible facilities, and we measure our progress with both safety metrics and leading indicators. We believe every employee and contractor has a responsibility for safety, and we proactively identify and manage risk, conduct ourselves responsibly, exercise good judgement, and take accountability for our actions. In 2020, our employees worked more than 12 million hours with 22 recordable injuries and no fatalities from our operations, and our contractors worked more than 8 million hours with 18 recordable injuries and no fatalities from our operations. For the ninth year in a row our aggregate employee plus contractor total recordable injury rate was lower than the prior year, and 2020 was the lowest in our history.

As we worked through the COVID-19 environment and took actions to protect our employees, Tronox carefully monitored the impacts to our operations. We were able to operate globally without material disruption. We put prudent and proportionate measures in place, such as restricted employee travel, remote working, staggered shifts, wellness checkpoints at our entrances, visitor restrictions and more robust sanitation, and disinfecting procedures.

Culture

We aim to create an organizational culture underpinned by people operating with an outward mindset, where we see others as people who matter like we do. We take into account their needs, challenges, and objectives, and we focus on collective results.

In furtherance of such goal, nearly all of our employees has been through training and development courses to learn about working with an outward mindset and we believe that as they have understood the value of living with an outward mindset, they have embraced it. We have seen a transformation in our culture, and also in our results, starting with safety: our people truly care for one another, and not only other employees, but also our contractors, visitors and communities. Shaped by an outward mindset, our people have embraced our global diversity and are naturally inclusive. We believe operating with an outward mindset was one of the primary reasons we were able to effectively integrate the employees of the legacy Cristal business into the Tronox organization, as our people welcomed new colleagues properly and sought to make each other successful.

Today, we are a collaborative group of people who naturally want to be helpful to others, and we adjust our own efforts to make our colleagues' work easier, however we can.

Building on the foundation of an outward mindset, we have adopted a set of core values that describes our expectations of one another, starting with safety. Every performance review starts with a self-assessment and manager's assessment of our consistency in living our values. Employees are encouraged – and provided a toolkit – to develop in the values where they are weak, and to help coach others in the values where they are strong.

Tronox Core Values

- We have an uncompromising focus on operating safe, reliable and responsible facilities.
- We honor our responsibility to create value for stakeholders.
- We treat others with respect, and act with personal and organizational integrity.
- We build our organization with diverse, talented people who make a positive difference and we invest in their success.
- We are adaptable, decisive and effective.
- We are trustworthy and reliable, and we build mutually rewarding relationships.
- We share accountability, and have high expectations for ourselves and one another.
- We do the right work the right way in every aspect of our business.
- We celebrate the joy of working together to accomplish great things.

Capabilities

Developing the operating and technical skills of our people, and the leadership competencies of our leaders, is an essential component of our business strategy.

At the beginning of 2020 we assessed the competencies of our senior leaders on ten dimensions, and then identified a competency on which they would focus their development during the year. Leaders were encouraged to access targeted executive education courses that aligned with their development from a new online program we offered.

In addition to our focus on leadership development, we continued to leverage and enhance our employees learning through the following initiatives:

- Offered online education to all employees via a broad based global learning platform, providing leadership development, business skills and information technology;
- Launched an education series covering topics specific to Tronox using video webinars available globally; and
- Completed a technical skills assessment of our workforce in the areas of mining, smelting/furnaces, chlorination, oxidation, finishing, and packaging, and began developing a program to build the capabilities for our future.

In addition, our employees are further guided by our code of conduct and business ethics and we conduct global training to help them fully understand and comply with such code of conduct.

We also have a rigorous succession planning process with respect to key positions throughout the organization. We believe such process allows us to proactively develop the talent of the future and allows us to move with speed and agility when leadership changes are required, as was demonstrated in the recent appointment of our interim co-CEOs and the election of our interim Chairman of the Board of Directors. As part of the succession planning process, high potential leaders are identified and development plans are completed for each candidate.

Environmental, Health and Safety Authorizations

Mining

Our facilities and operations are subject to extensive general and industry-specific environmental, health and safety regulations in jurisdictions where we operate, but particularly South Africa and Australia. These regulations include those relating to mine rehabilitation, liability provision, water management, the handling and disposal of hazardous and non-hazardous materials, and occupational health and safety. The various legislation and regulations are subject to a number of internal and external audits. We believe our mineral sands operations are in compliance, in all material respects, with existing health, safety and environmental legislation and regulations.

Regulation of the Mining Industry in South Africa

The South African mining regulatory regime is comprehensive and requires regular reporting to applicable government departments. A failure to, among other things, comply with any such reporting requirements or the conditions of any mining license could result in extended mandatory shutdown periods, license and/or mining right suspensions or revocations all of which could impact our business.

In South Africa, the primary legislative enactments with which our mines are required to comply are the Mineral and Petroleum Resources Development Act (“MPRDA”) which governs the acquisition and retention of prospecting and mining rights. In addition, the Mine Health and Safety Act governs the manner in which mining must be conducted from a health and safety perspective, while the National Environmental Management Act (and its subsidiary legislation) provides the underlying framework with respect to environmental rules and regulation for which our operations must comply. For additional details regarding other South African legislative enactments that govern our mining licenses please see the section entitled “Risk Factors” set forth elsewhere in this Form 10-K.

Regulation of the Mining Industry in Australia

Each Australian state and territory has its own legislation regulating the exploration for and mining of minerals. Our key exploration and mining operations are regulated by the Mining Act 1978 (WA), the Mining Act 1992 (NSW) and their related regulations.

In Western Australia, State Agreements are contracts between the State and the proponents of major resources projects within Western Australia, and are intended to foster resource development and related infrastructure investments. These agreements are approved and ratified by the Parliament of Western Australia. The State Agreement relevant to the development of certain of our Western Australian operations is the agreement authorized by the Mineral Sands (Cooljarloo) Mining and Processing Agreement Act 1988 (WA). This agreement concluded in March 2020 and Tronox's rights and obligations are now covered by the Western Australian Mining Act.

Regulation of Finished Product Manufacturing

Our business is subject to extensive regulation by federal, state, local and foreign governments. Governmental authorities regulate the generation and treatment of waste and air emissions at our operations and facilities. At many of our operations, we also comply with worldwide, voluntary standards developed by the International Organization for Standardization (“ISO”), a nongovernmental organization that promotes the development of standards and serves as a bridging organization for quality and environmental standards, such as ISO 9002 for quality management and ISO 14001 for environmental management.

Chemical Registration

As a chemical manufacturer with global operations, we are subject to a wide array of regulations regarding the import, export, labelling, use, storage and disposal of our products. We are obliged to comply with the regulation of chemical substances and inventories under the Toxic Substances Control Act in the United States and the Registration, Evaluation and Authorization of Chemicals (“REACH”) regulation in Europe, as well as a growing list of analogous regimes in other parts of the world, including China, South Korea and Taiwan. Manufacturers and importers of chemical substances must register information regarding the properties of their existing chemical substances with the European Chemicals Agency (“ECHA”). REACH regulations also require chemical substances, which are newly imported or manufactured in the EU to be registered before being placed on the market. In addition, REACH requires registrants to update registrations within specified timelines, as well as when with there may be new information relevant to human health or environmental risks of the substance. In addition, REACH includes a mechanism to evaluate substances to determine if it poses risk to human health and/or the environment. In May 2016, France’s competent authority under REACH submitted a proposal to ECHA that would classify TiO_2 pigment as carcinogenic in humans by inhalation. In February 2020, the European Commission adopted a regulation classifying the powder form of TiO_2 as a Category 2 Carcinogen by inhalation. The labelling regulation will come into effect in October 2021. For additional information on this topic, see section entitled "Risk Factors - Risks Relating to our Business - The classification of TiO_2 as a Category 2 Carcinogen in the European Union could result in more stringent regulatory control with respect to TiO_2."

Greenhouse Gas Regulation

Globally, our operations are subject to regulations that seek to reduce emissions of “greenhouse gases” (“GHGs”). We currently report and manage GHG emissions as required by law for sites located in jurisdictions requiring such managing and reporting of GHGs, primarily the European Union and Australia.

Available Information

Our public internet site is http://www.tronox.com. The content of our internet site is available for information purposes only and is included as an inactive textual reference. It should not be relied upon for investment purposes, nor is it incorporated by reference into this annual report on Form 10-K unless expressly noted. We make available, free of charge, on or through the investor relations section of our internet site, our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, proxy statements and Forms 3, 4 and 5 filed on behalf of directors and executive officers, as well as any amendments to those reports filed or furnished pursuant to the U.S. Securities and Exchange Act of 1934, as amended (the “Exchange Act”) as soon as reasonably practicable after we electronically file such material with, or furnish it to, the U.S. Securities and Exchange Commission (the “SEC”).

We file current, annual and quarterly reports, proxy statements and other information required by the Exchange Act with the SEC. Our SEC filings are also available to the public from the SEC’s internet site at http://www.sec.gov. The content of the SEC's internet site is available for informational purposes only and is included as an inactive textual reference. It should not be relied upon for investment purposes, nor is it incorporated by reference into this annual report on Form 10-K unless expressly noted.

Item 1A. Risk Factors

Item 1A. Risk Factors

You should carefully consider the risk factors set forth below, as well as the other information contained in this Form 10-K, including our consolidated financial statements and related notes. This Form 10-K contains forward-looking statements that involve risks and uncertainties. Any of the following risks could materially and adversely affect our business, financial condition or results of operations. Additional risks and uncertainties not currently known to us or those we currently view to be immaterial may also materially and adversely affect our business, financial condition or results of operations. The following risk factors are not necessarily presented in order of relative importance and should not be considered to represent a complete set of all potential risks that could affect our business, financial condition or results of operations.

RISKS RELATING TO OUR BUSINESS

Market conditions, as well as global and regional economic downturns that adversely affect the demand for our end-use products, could adversely affect the results of our operations and the prices at which we can sell our products, thus, negatively impacting our financial results.

Our revenue and results of operations are significantly dependent on sales of TiO_2 products and zircon. Demand for these products historically have been linked to global, regional and local GDP and discretionary spending, which can be negatively impacted by regional and world events or economic and market conditions. Such events can cause a decrease in demand for our products and market prices to fall, which may have an adverse effect on our results of operations and financial condition. A substantial portion of our products and raw materials are commodities that reprice as market supply and demand fundamentals change. Accordingly, product margins and the results of operations tend to vary with changes in the business cycle.

A significant portion of the demand for our TiO_2 products comes from manufacturers of paint and plastics. A significant portion of the demand for zircon comes from the construction and other industrial end markets. Our customers may experience significant fluctuations in demand for their own end products because of economic conditions, changes in consumer demand, or increases in raw material and energy costs. In addition, with respect to the zircon market, we believe that China currently accounts for approximately 50% of the world’s demand for zircon. As such, any prolonged downturn in China could have a material adverse effect on our business and financial results.

The price of our products, in particular, TiO_2, zircon, and pig iron, have been, and in the future may be, volatile. Price declines for our products will negatively affect our financial position and results of operations.

Historically, the global market for TiO_2, zircon and pig iron have been volatile, and those markets are likely to remain volatile in the future. Prices for TiO_2, zircon and pig iron may fluctuate in response to relatively minor changes in the supply of, and demand for, these products, market uncertainty and other factors beyond our control. Factors that affect the price of our products include, among other things:

- overall economic conditions;
- the level of customer demand particularly in the paint, plastics and construction industries;
- the level of production and exports of our products globally;
- the level of production and cost of materials used to produce our products;
- the cost of energy consumed in the production of TiO_2 and zircon, including the price of natural gas, electricity and coal;
- the impact of competitors increasing their capacity and exports;
- domestic and foreign governmental relations, tariffs or other trade disputes, regulations and taxes; and
- political conditions or hostilities and unrest in regions where we export our TiO_2, zircon and feedstock/other products.

Pricing pressure with respect to our TiO_2 products, zircon and pig iron can make it difficult to predict the cash we may have on hand at any given time, and a prolonged period of price declines may materially and adversely affect our financial position, liquidity, ability to finance planned capital expenditures and results of operations.

The ongoing global COVID-19 pandemic has adversely affected, and may continue to adversely affect, our business, financial condition and results of operations.

The ongoing global COVID-19 pandemic, including new strains of the virus, has adversely affected, and may continue to adversely affect, our business, financial condition and results of operations. We have significant sales and manufacturing operations in the U.S., Europe, South Africa, Brazil, the Kingdom of Saudi Arabia and Australia, and each of these countries has been significantly affected by the outbreak and taken measures to try to contain it. These restrictive measures have adversely impacted, and may further adversely impact, our workforce and operations, the operations of our customers, and those of our respective vendors and suppliers. In addition, although our business is currently designated as “essential” to support the continued manufacturing of products such as food and medical packaging, medical equipment, pharmaceuticals and personal protective equipment, there is no assurance that such designation will continue or, notwithstanding such designation, that demand for our products will not decrease as a result of the pandemic. Any such future developments are dependent upon factors including, but are not limited to, the duration and spread of the outbreak, the severity of new strains of the virus, the actions to contain the virus or treat its impact, the effectiveness of treatments and vaccines, the size and effectiveness of the compensating measures taken by governments, including the failure to implement additional stimuli and how quickly and to what extent normal economic and operating conditions can resume.

In addition, the COVID-19 pandemic has significantly increased economic and demand uncertainty. It is possible that the continued spread of COVID-19, including new strains of the virus, will cause an additional economic slowdown, and it is possible that this could cause a global recession. Such adverse impact on the global economy is likely to adversely affect our performance, financial condition and results of operations, as well as our ability to successfully execute our business strategies and initiatives, such as the funding of capital expenditures, including by negatively impacting the demand for our products and services, negatively affecting the parties with whom we do business and disrupting our ability to conduct product development and other important business activities.

To the extent the COVID-19 pandemic continues to adversely affect the global economy, and/or adversely affects our business, operations or financial performance, it may also have the effect of increasing the likelihood and/or magnitude of other risks described in this section entitled “Risk Factors”. We are closely monitoring the potential adverse effects and impact on our operations, businesses and financial performance, including liquidity and capital usage, though the extent is difficult to fully predict at this time due to the rapid evolution of this uncertain situation.

Our industry and the end-use markets in which we compete are highly competitive. This competition may adversely affect our results of operations and operating cash flows.

Each of our markets is highly competitive. Competition in the TiO_2 industry is based on a number of factors such as price, product quality, and service. We face significant competition from major international and smaller regional competitors, including producers in China. Moreover, Chinese producers have significantly expanded their production capacity in recent years and have also commenced the commercial production of TiO_2 via chloride technology. The risk of substitution of these Chinese producers by our customers could increase as these Chinese producers expand their use of chloride technology, improve the quality of their chloride technology, and continue to improve the quality of their sulfate products. Moreover, we compete with a large number of mining companies with respect to zircon. Zircon producers generally compete on the basis of price, quality, logistics, delivery, and payment terms and consistency of supply.

Within the end-use markets in which we compete, competition between products is intense. We face substantial risk that our customers could switch to our competitors’ products in response to any number of developments including lower price offerings by our competitors for substantially the same products, new product development by competitors, increased commercial production of TiO_2 via chloride technology by Chinese producers, greater acceptance of TiO_2 produced via sulfate technology in end-market applications previously characterized by TiO_2 produced via chloride technology, or with respect to zircon customers, switching to lower priced substitute products. Our inability to develop, produce or market our products to compete effectively against our competitors could have a material adverse effect on our business, financial condition, results of operations and cash flow.

An increase in the price of energy or other raw materials, or an interruption in our energy or other raw material supply, could have a material adverse effect on our business, financial condition or results of operations.

Our mining, beneficiation, smelting and production processes consume significant amounts of energy and raw materials, the costs of which can be subject to worldwide, as well as, local supply and demand, as well as other factors beyond our control. Fuel and energy linked to commodities, such as diesel, heavy fuel oil and coal, and other consumables, such as chlorine, illuminating paraffin, electrodes, sulfur and anthracite, consumed in our TiO_2 manufacturing and mining operations form an important part of our TiO_2 operating costs. We have no control over the costs of these consumables, many of which are linked to some degree to the price of oil and coal, and the costs of many of these raw materials may fluctuate widely for a variety of reasons, including changes in availability, major capacity additions or reductions, or significant facility operating problems. These fluctuations could negatively affect our operating margins, our results of operations or planned capital expenditures. As these costs rise, our operating expenses will increase and could adversely affect our business, especially if we are unable to pass price increases in raw materials through to our customers.

The markets for many of our products have seasonally affected sales patterns.

The demand for our products is subject to seasonal fluctuations. TiO_2 is widely used in paint and other coatings where demand increases prior to the painting season in the Northern Hemisphere (spring and summer). Additionally, although zircon is generally a non-seasonal product, it is negatively impacted by the winter and Chinese New Year celebrations due to reduced zircon demand from China. We may be adversely affected by existing or future cyclical changes, and such conditions may be sustained or further aggravated by anticipated or unanticipated changes in regional weather conditions. For example, poor weather conditions in a region can lead to an abbreviated painting season, which can depress consumer sales of paint products that use TiO_2.

We are dependent on, and compete with other mining and chemical businesses for, key human resources in the countries in which we operate, and our business will suffer if we are unable to hire highly skilled employees or if our key officers or employees discontinue employment with us.

We compete with other chemical and mining companies, and other companies generally, in the countries in which we operate to attract and retain key human resources at all levels with the appropriate technical skills and operating and managerial experience necessary to continue operating and expanding our businesses. These operations use modern techniques and equipment and accordingly require various types of skilled workers. The success of our business will be materially dependent upon the skills, experience and efforts of our key officers and skilled employees. Competition for skilled employees may cost us in terms of higher labor costs or reduced productivity. As a result, we may not be able to attract and retain skilled and experienced employees. Should we lose any of our key personnel or fail to attract and retain key qualified personnel or other skilled employees, our business may be harmed and our operational results and financial condition could be affected.

If we are unable to innovate and successfully introduce new products, or new technologies or processes reduce the demand for our products or the price at which we can sell products, our results of operations could be adversely affected.

Our industries and the end-use markets into which we sell our products experience periodic technological change and product improvement. Our financial condition and results of operations could be adversely affected if we are unable to gauge the direction of commercial and technological progress in key end-use markets or if we fail to fund and successfully develop, manufacture and market products in such changing end-use markets.

In addition, new technologies or processes have the potential to replace or provide lower-cost alternatives to our products, such as new processes that reduce the amount of TiO_2 or zircon content in consumer products which in turn could depress the demand and pricing for TiO_2 or zircon, respectively. We cannot predict whether technological innovations will, in the future, result in a lower demand for our products or affect the competitiveness of our business. We may be required to invest significant resources to adapt to changing technologies, markets and competitive environments.

Given the nature of our chemical, mining and smelting operations, we face a material risk of liability, production delays and additional expenditures from environmental and industrial accidents.

Our business is exposed to, among other things, environmental hazards and industrial accidents the occurrence of which could delay production, suspend operations, increase repair, maintenance or medical costs and, due to the vertical integration of our operations, could have an adverse effect on the productivity and results of operations of a particular manufacturing facility or on our business as a whole. Furthermore, during operational breakdowns resulting from any such environmental hazard or industrial accident, the relevant facility may not be restored to full operations within the anticipated timeframe, which could result in further business losses. Over our operating history, we have incurred incidents of this nature. If any of the equipment on which we depend were severely damaged or were destroyed by fire, flooding, or otherwise, we may be unable to replace or repair it in a timely manner or at a reasonable cost, which would impact our ability to produce and ship our products, which would have a material adverse effect on our business, financial condition or results of operations.

Equipment failures and deterioration of assets may lead to production curtailments, shutdowns or additional expenditures.

Our operations depend upon critical equipment that must periodically maintained and upgraded in order to avoid suffering unanticipated breakdowns or failures. As a result, our mining operations and processing plants may be interrupted or curtailed by equipment failures, which could have a material adverse effect on our results of operations. In addition, assets critical to our mining and chemical processing operations may deteriorate due to wear and tear or otherwise sooner than we currently estimate. Such deterioration may result in additional maintenance spending and additional capital expenditures. If these assets do not generate the amount of future cash flows that we expect, and we are not able to refurbish them or procure replacement assets in an economically feasible manner, our future results of operations may be materially and adversely affected.

Our results of operations and financial condition could be seriously impacted by security breaches, including cybersecurity incidents.

We rely on information technology systems across our operations to manage our accounting, finance, and supply chain functions. Our information technology is provided by a combination of internal and external services and service providers. Further, our business involves the use, processing, storage and transmission of information about customers, suppliers and employees using such information technology systems. Our ability to effectively operate our business depends on the security, reliability and capacity of these systems.

Like most major corporations, we may become the target of cyberattacks, including industrial espionage or ransomware attacks, from time to time. For instance, the Cristal business we acquired in April 2019 was subject to a significant cybersecurity attack in 2017. Failure to effectively prevent, detect and recover from security breaches, including attacks on information technology and infrastructure by hackers; viruses; breaches due to employee error or actions; or other disruptions could seriously harm our operations as well as the operations of our customers and suppliers. Such serious harm can involve, among other things, misuse of our assets, business disruptions, loss of data, unauthorized access to trade secrets and confidential business information, unauthorized access to personal information, legal claims or proceedings, reporting errors, processing inefficiencies, negative media attention, reputational harm, loss of sales, remediation and increased insurance costs, and interference with regulatory compliance. We have experienced, and expect to continue to experience, these types of cybersecurity threats and incidents, which may be material.

We have put in place security measures designed to protect against cyberattacks, security breaches and misappropriation or corruption of our systems, intentional or unintentional disclosure of confidential information, or disruption of our operations. As these threats continue to evolve, particularly around cybersecurity, we may be required to expend significant resources to enhance our control environment, processes, practices and other protective measures. Despite these efforts, we may not be able to prevent cyberattacks and other security breaches and such events could materially adversely affect our business, financial condition or results of operations.

Our ore resources and reserve estimates are based on a number of assumptions, including mining and recovery factors, future cash costs of production and ore demand and pricing. As a result, ore resources and reserve quantities actually produced may differ from current estimates.

The mineral resource and reserve estimates are estimates of the quantity and ore grades in our mines based on the interpretation of geological data obtained from drill holes and other sampling techniques, as well as from feasibility studies. The accuracy of these estimates is dependent on the assumptions and judgments made in interpreting the geological data in accordance with established guidelines and standards. Our mineral reserves represent the amount of ore that we believe can be economically mined and processed, and are estimated based on a number of factors, which have been stated in accordance with SEC Industry

Guide 7, the South African Code for Reporting of Exploration Results, Mineral Resources and Mineral Reserves 2007 version, as amended SAMREC and the Australian code for Reporting of Exploration Results, Mineral Resources the Joint Ore Reserves Committee Code (2012) (JORC).

There is significant uncertainty in any mineral reserve or mineral resource estimate. Factors that are beyond our control, such as the ability to secure mineral rights, the sufficiency of mineralization to support mining and beneficiation practices and the suitability of the market may significantly impact mineral resource and reserve estimates. The actual deposits encountered and the economic viability of mining a deposit may differ materially from our estimates. Since these mineral resources and reserves are estimates based on assumptions, we may revise these estimates in the future as we become aware of new developments. To maintain TiO_2 feedstock and zircon production beyond the expected lives of our existing mines or to increase production materially above projected levels, we will need to access additional reserves through exploration or discovery.

RISKS RELATING TO THE GLOBAL NATURE OF OUR BUSINESS

We are exposed to the risks of operating a global business.

We have operations in jurisdictions around the globe which subjects us to a number of risks, including:

- adapting to unfamiliar regional and geopolitical conditions and demands, including political instability, civil unrest, expropriation, nationalization of properties by a government, imposition of sanctions, changes to import or export regulations and fees, renegotiation or nullification of existing agreements, mining leases and permits;
- increased difficulties with regard to political and social attitudes, laws, rules, regulations and policies within countries that favor domestic companies over non-domestic companies, including customer- or government-supported efforts to promote the development and growth of local competitors;
- economic and commercial instability risks, including those caused by sovereign and private debt default, corruption, and new and unfamiliar laws and regulations at national, regional and local levels, including taxation regimes, tariffs and trade barriers, exchange controls, repatriation of earnings, and labor and environmental and health and safety laws and regulations;
- implementation of additional technological and cybersecurity measures and cost reduction efforts, including restructuring activities, which may adversely affect our ability to capitalize on opportunities;
- major public health issues which could cause, and have caused, disruptions in our operations or workforce;
- war or terrorist activities;
- difficulties enforcing intellectual property and contractual rights in certain jurisdictions; and
- unexpected events, including fires or explosions at facilities, and natural disasters.

Political and social instability, and unrest, and actual, or potential, armed conflicts in the Middle East region may affect the Company's results of operations and financial position.

Our operations in KSA have been affected in the past, and may be affected in the future, by the political, social and economic conditions from time to time prevailing in, or affecting, KSA or the wider Middle East region, including by rocket attacks from armed rebel groups. For example, since 2011, a number of countries in the Middle East region have witnessed significant social unrest, including widespread public demonstrations, and, in certain cases, armed conflict, terrorist attacks, diplomatic disputes, foreign military intervention and a change of government. In addition, KSA faces a number of challenges arising mainly from the relatively high levels of unemployment among the Saudi youth population, requests for political and social changes, and the security threat posed by certain groups. Should KSA experience similar political and social unrest as found in other countries in the Middle East, the Saudi Arabian economy could be adversely affected, our TiO_2 plant located in Yanbu could be temporarily disrupted or materially adversely affected and our business and operating results could be materially adversely affected.

In addition, one of our TiO_2 pigment plants is located in Yanbu, and the Slagger, that is subject to the Option or Put, is located in Jazan. Yanbu and Jazan have both been subject to rocket attacks from armed rebel groups fighting the KSA military in Yemen which could materially adversely affect our business and operating results.

South Africa, where we have large mining assets and derive a significant portion of our revenue and profit, poses distinct operational risks which could affect our business, financial condition and results of operations.

In South Africa, we currently operate two significant mining assets, as well as accompanying separation plants and smelting operations, and derive a significant portion of our profit from the sale of zircon. Our mining and smelting operations depend on electrical power generated by Eskom, the sole, state-owned energy supplier. Eskom has not been able to reliably provide electrical power and as a result "load-shedding" (planned and unplanned rolling power outages) is expected for the foreseeable future. In addition, South African electricity prices have risen during the past few years, and future price increases are expected to occur. As such, restrictions or additional conditions imposed by Eskom such as load shedding, electricity restrictions and/or electricity price increases could have a material adverse effect on our business, financial conditions or results of operations.

In addition, our KZN Sands operations currently use approximately 360,000 gigajoules of Sasol gas, which is available only from Sasol Limited. As such, an interruption in the supply of Sasol gas could have a material adverse effect on our business, financial conditions or results of operations.

Moreover, certain regions of South Africa have experienced in the past, and are prone to, drought conditions resulting in water restrictions being imposed in such areas. We use significant amounts of water in our South African operations. A prolonged drought in a region of South Africa where our operations are located may lead to water use restrictions which could have a material adverse effect on our business, financial condition or results of operations. In addition, under South African law, our South African mining operations are subject to water-use licenses that govern each operation. These licenses require, among other conditions, that mining operations achieve and maintain certain water quality limits for all water discharges, where applicable. Changes to water-use licenses could increase our costs of operations thereby affecting our operational results and financial condition.

Our operations in South Africa are also reliant on services provided by the State-owned, sole provider of rail transport, Transnet. Furthermore, Transnet provides extensive dockside services at both the ports of Richards Bay and Saldanha Bay via Transnet Port Authority. Delays or interruptions at either the rail service or the ports in which we receive and/or export material could have a negative impact on our business, financial condition and results of operations.

The aforementioned operational risks, as well as any other foreseen or unforeseen operational risks primarily related to doing business in South Africa, could have a material adverse effect on our business, financial condition or results of operations.

As an emerging market, South Africa poses a challenging array of long-term political and economic risks.

South Africa continues to undergo political and economic challenges. Changes to, or instability in, the economic or political environment in South Africa, especially if such changes create political instability, actual or potential shortages of production materials or labor unrest, could result in production delays and production shortfalls, and materially impact our production and results of operations.

The South African government has recently embarked on a process of identifying and securing land for persons who were previously dispossessed of such land as a result of Apartheid policies. In December 2019, the South African government released a draft land expropriation bill for public comment. The land expropriation bill contemplates that, where it is in the “public interest”, land may be expropriated by the South African government, without compensation being payable to the current owners. While the South African government has indicated that such measures will be applied initially to state-owned land, it is possible that such measures may extend to agricultural and mining areas. In the event that the land on which the Namakwa Sands and KZN Sands operations are situated areas become the subject of a land claim under any such proposed or future land expropriation bill, it may have a material adverse effect on our business, financial condition or results of operations.

In addition, South Africa’s exchange control regulations require resident companies to obtain the prior approval of the South African Reserve Bank to raise capital in any currency other than the Rand, and restrict the export of capital from South Africa. While the South African government has relaxed exchange controls in recent years, it is difficult to predict whether or how it will further change or abolish exchange control measures in the future. These exchange control restrictions could hinder our financial and strategic flexibility, particularly our ability to use South African capital to fund acquisitions, capital expenditures, and new projects outside of South Africa.

Moreover, our operations have been affected by inflation in South Africa in recent years. Employment costs and wages in South Africa have increased in recent years, resulting in significant cost pressures for the mining industry. Prolonged or heightened inflation and associated cost pressures could have a material adverse effect on our business, financial condition or results of operations.

In addition, our South African operations have entered into various collective agreements with organized labor regulating wages and working conditions at our mines and smelter operations. There have been periods when various stakeholders have been unable to agree on dispute resolution processes, leading to threats of disruptive industrial action disputes. Due to the high level of employee union membership, our South African operations are at risk of production stoppages for indefinite periods due to strikes and other labor disputes. Although we believe that we have good labor relations with our South African employees, we may experience labor disputes in the future.

Although we believe that our relationships with our various local communities are good, the areas in which our South African operations are situated are the traditional homelands of various tribal groupings that are historically politically volatile. This volatility persists today and frequently results in violent, destructive behaviors. Increased volatility and any consequential civil unrest may result in production stoppages and/or the destruction of assets which comprise our South African operations, any of which could have an material adverse effect on our business, financial condition or results of operations.

Economic conditions and regulatory changes following the U.K.'s exit from the E.U. could adversely impact our operations, operating results and financial condition.

The U.K. has withdrawn from the E.U. (often referred to as Brexit). Since December 31, 2020, the U.K. has left the E.U. customs union and single market and is no longer required to follow E.U. laws. It is expected that Brexit will impact economic conditions in the U.K. and the E.U. but given the lack of comparable precedent, it is unclear what financial, trade and legal implications the withdrawal of the U.K. from the E.U. will have and how such withdrawal will affect us.

The consequences of Brexit could adversely impact the markets in which we and our customers operate. Brexit could also create uncertainty with respect to the legal and regulatory requirements to which we are subject and lead to divergent national laws and regulations as the U.K. government determines which E.U. laws to replace or replicate. Due to Brexit, adverse consequences such as deterioration in economic conditions, volatility in currency exchange rates or adverse changes in regulation could have a negative impact on our future operations, operating results and financial condition.

Our results of operations may be adversely affected by fluctuations in currency exchange rates.

The financial condition and results of operations of our operating entities outside the U.S. are reported in various foreign currencies, primarily the South African Rand, Australian Dollars, Euros, Pound Sterling and Brazilian Real and then converted into U.S. dollars at the applicable exchange rate for inclusion in the financial statements. A significant portion of our costs are denominated in currencies other than the U.S. dollar. As a result, any volatility of the U.S. dollar against these foreign currencies creates uncertainty for, and may have a negative impact on, reported sales and operating margin. In addition, our operating entities often need to convert currencies they receive for their products into currencies in which they purchase raw materials or pay for services, which could result in a gain or loss depending on fluctuations in exchange rates. In order to manage this risk, we have, from time to time, entered into forward contracts to buy and sell foreign currencies.

RISKS RELATING TO OUR DEBT AND CAPITAL STRUCTURE

We are a holding company that is dependent on cash flows from our operating subsidiaries to fund our debt obligations, capital expenditures and ongoing operations.

All of our operations are conducted, and all of our assets are owned, by our operating companies, which are our subsidiaries. We intend to continue to conduct our operations at the operating company level. Consequently, our cash flow and our ability to meet our obligations or make cash distributions depends upon the cash flow of our operating companies, and the payment of funds by our operating companies in the form of dividends or otherwise. The ability of our operating companies to make any payments to us depends on their earnings, the terms of their indebtedness, including the terms of any credit facilities, or indentures, and legal restrictions regarding the transfer of funds.

Our ability to service our debt and fund our planned capital expenditures and ongoing operations will depend on our ability to generate and increase cash flow, and our access to additional liquidity sources. Our ability to generate and increase cash flow is dependent on many factors, including many of other risks described in this section entitled "Risk Factors".

The agreements and instruments governing our debt contain restrictions and limitations that could affect our ability to operate our business, as well as impact our liquidity.

As of December 31, 2020, our total principal amount of debt was approximately $3.4 billion. Our credit facilities contain covenants that could adversely affect our ability to operate our business, our liquidity, and our results of operations. These covenants may restrict, among other things, our and our subsidiaries' ability to:

- incur or guarantee additional indebtedness;
- complete asset sales, acquisitions or mergers;
- make investments and capital expenditures;
- prepay other indebtedness;

- enter into transactions with affiliates; and
- fund additional dividends or repurchase shares.

Certain of our indebtedness facilities and senior notes include requirements relating to the ratio of adjusted EBITDA to indebtedness or certain fixed charges. The breach of any covenants or obligations in our credit facilities, not otherwise waived or amended, could result in a default under the applicable debt obligations (and cross-defaults to certain other debt obligations) and could trigger acceleration of those obligations, which in turn could trigger other cross defaults under other existing or future agreements governing our long-term indebtedness. In addition, the secured lenders under the credit facilities could foreclose on their collateral, which includes equity interests in our subsidiaries, and exercise other rights of secured creditors. Any default under those credit facilities could adversely affect our growth, our financial condition, our results of operations and our ability to make payments on our credit facilities, and could force us to seek the protection of bankruptcy laws.

We may need additional capital in the future and may not be able to obtain it on favorable terms, and such capital expenditure projects may not realize expected investment returns.

Our business is capital intensive, and our success depends to a significant degree on our ability to maintain our manufacturing operations and invest in those operations to expand capacity and remain competitive from a cost perspective. We may require additional capital in the future to finance capital investments, including any new mines that replace mines that are end of life, potential expansion or optimization of existing production facilities or mining operations, fund ongoing research and development activities and meet general working capital needs. For instance, in 2020 we began the implementation of a multi-year global digital transformation strategy that is expected to include the establishment of increased automation of both operational and financial systems, including the global ERP, through new and upgraded systems, technology and processes. The risks relating to such digital transformation include any new information and operational technologies not being properly designed, integrated, managed, and/or implemented in a timely manner which could significantly increase the program’s costs, and negatively impact our operations, including, our plant’s system safety, functionality and effectiveness. Although we have taken, and will continue to take, significant steps to mitigate the potential negative impact of the implementation of such new digital systems, there can be no assurance that these procedures will be completely successful. Additionally, we entered into the Option Agreement with AMIC pursuant to which AMIC granted us an option to acquire 90% of a SPV, to which AMIC’s ownership in the Slagger will be contributed together with $322 million of indebtedness currently held by AMIC. Upon exercise of the Option or Put, there can be no assurance that we may assume this indebtedness and may need to obtain funding to repay it at maturity. In the event we require any additional financing, such financing may not be available when needed on terms favorable to us, or at all. If we are unable to obtain adequate funds on acceptable terms, we may be unable to maintain, expand or lower the operating costs of our facilities or take advantage of future opportunities or respond to competitive pressures, which could harm our results of operations, financial condition and business prospects. Additionally, if we undertake these projects, they may not be completed on schedule, at the budgeted cost, or at all. Moreover, our revenue may not increase immediately upon the expenditure of funds on a particular project. As a result, we may not be able to realize our expected investment return, which could adversely affect our results of operations and financial condition.

RISKS RELATING TO OUR LEGAL AND REGULATORY ENVIRONMENT

Our South African mining rights are subject to onerous regulatory requirements imposed by legislation and the Department of Mineral Resources (the “DMR”), the compliance of which could have a material adverse effect on our business, financial condition and results of operations.

Black economic empowerment (“BEE”) legislation was introduced into South Africa as a means to seek to redress the inequalities of the previous apartheid system by requiring the inclusion of historically disadvantaged South Africans in the mainstream economy. Under BEE legislation, certain of our operations are required to be partially owned by historically disadvantaged South Africans --- known as “empowerment” --- and comply with Mining Charter III which came into effect as of March 1, 2019. Under the “empowerment” rules of Mining Charter III, certain of our operations require a 30% BEE shareholding that must be structured through a special purpose vehicle comprised of black entrepreneurs, the local community surrounding the relevant mining area and eligible employees. In addition, Mining Charter III sets forth more stringent requirements applicable to all of our South African operations with regard to the procurement of goods and services from BEE compliant entities, race, age and gender based employment quotas; and workers’ housing and living conditions. While we believe we are currently in compliance with the provisions of Mining Charter III, the implementation guidelines are complex and remain untested. As a result, the manner in which Mining Charter III is enforced by the DMR may have a material adverse effect on our business, financial condition or results of operations.

Prior to Mining Charter III, black empowerment in the South African mining sector was governed by Mining Charter II. Under Mining Charter II, our South African operations were “empowered” by a 26% ownership interest in two of our South African subsidiaries by Exxaro which prior to 2017 was greater than 50% owned by historically disadvantaged South Africans.

We believe that under Mining Charter III the two South African subsidiaries in which Exxaro held 26% became permanently “empowered” --- so-called, “once empowered always empowered”. See "Risk Factors-We may elect to exercise certain "flip-in" rights to buy-out Exxaro's 26% ownership rights in our South African subsidiaries which might negatively impact the ownership of our heavy mineral sands mining rights" for more information.

“Once empowered always empowered” means that a South African company that has had the requisite shareholding base consisting of historically disadvantaged South Africans as at December 31, 2014 will always qualify as an “empowered” entity for purposes of the retention of an existing mining right for the duration of that right. The question of whether the “once empowered always empowered” principle applies in the mining industry in South Africa has been subject to litigation between the Minerals Council of South Africa (the “Minerals Council”) (formerly the Chamber of Mines, an industry body that represents approximately 90% of the South African Mining Industry) and the DMR. Although the South African High Court decided in the affirmative for the Minerals Council, the DMR has appealed the High Court ruling and the outcome remains pending. It is our opinion that the “once empowered always empowered” is applicable to our existing mining rights, but not in respect of applications for renewals of existing mining rights or applications for new mining rights made under the Mining Charter III. If DMR were to challenge our compliance with Mining Charter III or “once empowered always empowered” is otherwise not fully recognized, our business, financial condition or results of operation could be adversely affected.

Hence, with respect to the mining operations currently owned by the two subsidiaries in which Exxaro holds a 26% minority ownership interest, for the duration of our current mining rights we believe we are in compliance with all relevant BEE requirements regardless of Exxaro’s ownership interest. However, Mining Charter III requires that applications for renewals of existing mining rights or any new mining rights that we may desire to acquire in the future will require 30% historically disadvantaged South African ownership in the ratios set out in Mining Charter III.

We may elect to exercise certain “flip in” rights to buy-out Exxaro’s 26% ownership rights in our South African subsidiaries which might negatively impact the ownership of our heavy mineral sands mining rights.

In connection with the 2012 transaction with Exxaro, Exxaro was granted a “flip in” right such that following the occurrence of certain events, Exxaro would be entitled to exchange its 26% shareholding in our South African operating subsidiaries which hold our mining licenses for an additional 7.2 million ordinary shares. On November 26, 2018, we, certain of our subsidiaries and Exxaro entered into the Exxaro Mineral Sands Transaction Completion Agreement (the “Completion Agreement”) which amends the “flip-in” rights granted to Exxaro so that we may, subject to certain conditions, accelerate the occurrence of the “flip in.” If we elect to accelerate the “flip in” there can be no assurance that the DMR will not challenge our right to continue to operate our mineral sands mining operations based upon the failure of our South African subsidiaries to comply with all applicable BEE requirements. If DMR’s challenge is successful, our existing mining rights could be suspended or revoked which would have a material adverse effect on our business, financial conditions or results of operations.

Our failure to comply with the anti-corruption laws of the U.S. and various international jurisdictions could negatively impact our reputation and results of operations.

Doing business on a global basis requires us to comply with the laws and regulations of the U.S. government and those of various international jurisdictions, and our failure to successfully comply with these rules and regulations may expose us to liabilities. In particular, our operations are subject to U.S. and foreign anti-corruption laws and regulations, such as the U.S. Foreign Corrupt Practices Act (“FCPA”), the U.K. Bribery Act 2010 (“U.K. Bribery Act”), as well as anti-corruption laws of the various jurisdictions in which we operate. Our global operations may expose us to the risk of violating, or being accused of violating, the foregoing or other anti-corruption laws. Such violations could be punishable by criminal fines, imprisonment, civil penalties, disgorgement of profits, injunctions, and exclusion from government contracts, as well as other remedial measures. Investigations of alleged violations can be very expensive, disruptive, and damaging to our reputation. Although we have implemented anti-corruption policies and procedures, there can be no guarantee that these policies, procedures, and training will effectively prevent violations by our employees or representatives in the future. Additionally, we face a risk that our distributors and other business partners may violate the FCPA, the U.K. Bribery Act, or similar laws or regulations. Such violations could expose us to FCPA and U.K. Bribery Act liability and/or our reputation may potentially be harmed by their violations and resulting sanctions and fines.

The classification of TiO_2 as a Category 2 Carcinogen in the European Union could result in more stringent regulatory control of our products.

In May 2016, France’s competent authority under the EU’s Registration, Evaluation, Authorization and Restrictions of Chemicals (“REACH”) submitted a proposal to the European Chemicals Agency (“ECHA”) that would classify TiO_2 as carcinogenic in humans by inhalation. In February 2020, the European Commission adopted a regulation classifying the powder form of TiO_2 as a Category 2 Carcinogen by inhalation. The labelling regulation will come into effect in approximately October 2021. The classification of our products as a Category 2 Carcinogen could impact our business by inhibiting the marketing of products containing TiO2 to consumers, and subject our manufacturing operations to new regulations that could increase costs. The recent classification and labelling requirements imposed by the European Commission could have additional effects under other EU laws (e.g., those affecting medical and pharmaceutical applications, cosmetics, food packaging and food additives) and/or trigger heightened regulatory scrutiny in countries and local jurisdictions outside the EU based on health and safety grounds. It is also possible that heightened regulatory scrutiny would lead to claims by consumers or those involved in the production of such products alleging adverse health impacts. In addition, there is no assurance that other materials could also be subject to increased regulation which could impact the cost of labelling or the sales of our products.

We may be subject to litigation, the disposition of which could have a material adverse effect on our results of operations.

The nature of our operations exposes us to possible litigation claims, including disputes with competitors, customers, equipment vendors, environmental groups and other non-governmental organizations, and providers of shipping services. Some of the lawsuits may seek fines or penalties and damages in large amounts, or seek to restrict our business activities. Because of the uncertain nature of any litigation and coverage decisions, we cannot predict the outcome of these matters or whether insurance claims may mitigate any damages to us. Litigation is very costly, and the costs associated with prosecuting and defending litigation matters could have a material adverse effect on our results of operations and financial condition. See Note 20 of notes to our consolidated financial statements, included elsewhere in this Form 10-K for further information regarding our commitments and contingencies.

Our flexibility in managing our labor force may be adversely affected by labor and employment laws in the jurisdictions in which we operate, many of which are more onerous than those of the U.S.; and some of our labor force has substantial workers' council or trade union participation, which creates a risk of disruption from labor disputes and new laws affecting employment policies.

The vast majority of our employees are located outside the U.S. In most of those countries, labor and employment laws are more onerous than in the U.S. and, in many cases, grant significant job protection to employees, including rights on termination of employment. Moreover, many of our workforce outside the U.S. belong to unions and/or are represented by a collective bargaining agreement. As such, in such jurisdictions we are required to consult with, and seek the consent or advice of, various employee groups or works' councils that represent our employees for any changes to our activities or employee benefits. This requirement could have a significant impact on our flexibility in managing costs and responding to market changes.

We are subject to many environmental, health and safety regulations that may result in unanticipated costs or liabilities, which could reduce our profitability.

Our operations and production facilities are subject to extensive environmental and health and safety laws and regulations at national, international and local levels in numerous jurisdictions relating to use of natural resources, pollution, protection of the environment, mine site remediation, transporting and storing raw materials and finished products, and storing and disposing of hazardous wastes among other materials. Moreover, certain environmental laws impose joint and several and/or strict liability for costs to clean up and restore sites where pollutants have been disposed or otherwise spilled or released. We cannot be certain that we will not incur significant costs and liabilities for remediation or damage to property, natural resources or persons as a result of spills or releases from our operations or those of a third party.

The costs of compliance with the extensive environmental, health and safety laws and regulations or the inability to obtain, update or renew permits required for operation or expansion of our business could negatively impact our results of operations or otherwise adversely affect our business. If we fail to comply with the conditions of our permits governing the production and management of regulated materials, mineral sands mining licenses or leases or the provisions of the relevant jurisdictional laws in which we operate, these permits, mining licenses or leases and mining rights could be canceled or suspended, and we could be prevented from obtaining new mining and prospecting rights, which could materially and adversely affect our business, operating results and financial condition. Additionally, we could incur substantial costs, including fines, damages, criminal or civil sanctions and remediation costs, or experience interruptions in our operations, for violations arising under these laws and regulations, including operating without the required permits, mining licenses or leases and/or mining rights. In the event of a catastrophic incident involving any of the raw materials we use, or chemicals or mineral products we produce, we could incur material costs as a result of addressing the consequences of such event.

Changes to existing laws governing operations, especially changes in laws relating to transportation of mineral resources, the treatment of land and infrastructure, contaminated land, the remediation of mines, tax royalties, waste handling and management, exchange control restrictions, environmental remediation, mineral rights, ownership of mining assets, or the rights to prospect and mine may have a material adverse effect on our future business operations and financial performance. There is risk that onerous conditions may be attached to authorizations in the form of mining rights, water-use licenses, miscellaneous licenses and environmental approvals, or that the grant of these approvals may be delayed or not granted.

If our intellectual property were compromised or copied by competitors, or if competitors were to develop similar intellectual property independently, our results of operations could be negatively affected. Further, third parties may claim that we infringe on their intellectual property rights which could result in costly litigation.

Our success depends to a significant degree upon our ability to protect and preserve our patents and unpatented proprietary technology, operational knowledge and other trade secrets (collectively "intellectual property rights"). While we maintain policies to enter into confidentiality agreements with our employees and third parties to protect our intellectual property rights such rights may be challenged, invalidated, circumvented, and found unenforceable or otherwise compromised. In addition, we may be unable to determine when third parties are using our intellectual property rights without our authorization. The undetected or unremedied unauthorized use of our intellectual property rights or the legitimate development or acquisition of intellectual property related to our industry by third parties could reduce or eliminate any competitive advantage we have as a result of our intellectual property rights. If we must take legal action to protect, defend or enforce our intellectual property rights, any suits or proceedings could result in significant costs and diversion of our resources and our management’s attention, and we may not prevail in any such suits or proceedings. A failure to protect, defend or enforce our intellectual property rights could have an adverse effect on our financial condition and results of operations.

Although there are currently no pending or threatened proceedings or claims known to us that are material relating to alleged infringement, misappropriation or violation of the intellectual property rights of others, we may be subject to legal proceedings and claims in the future in which third parties allege that their patents or other intellectual property rights are infringed, misappropriated or otherwise violated by us or our products or processes. In the event that any such infringement, misappropriation or violation of the intellectual property rights of others is found, we may need to obtain licenses from those parties or substantially re-engineer our products or processes to avoid such infringement, misappropriation or violation. We might not be able to obtain the necessary licenses on acceptable terms or be able to re-engineer our products or processes successfully. Moreover, if we are found by a court of law to infringe, misappropriate or otherwise violate the intellectual property rights of others, we could be required to pay substantial damages or be enjoined from making, using or selling the infringing products or technology. We also could be enjoined from making, using or selling the allegedly infringing products or technology pending the final outcome of the suit. Any of the foregoing could adversely affect our financial condition and results of operations.

RISKS RELATING TO ACCOUNTING AND TAXATION

If our intangible assets or other long-lived assets become impaired, we may be required to record a significant noncash charge to earnings.

We have a significant amount of intangible assets and other long-lived assets on our consolidated balance sheets. Under U.S. GAAP, we review our intangible assets and other long-lived assets for impairment when events or changes in circumstances indicate the carrying value may not be recoverable. Factors that may be considered a change in circumstances, indicating that the carrying value of our intangible assets and other long-lived assets may not be recoverable, include, but are not limited to, a significant decline in share price and market capitalization, changes in the industries in which we operate, particularly the impact of a downturn in the global economy, as well as competition or other factors leading to reduction in expected long-term sales or results of operations. We may be required to record a significant noncash charge in our financial statements during the period in which any impairment of our intangible assets and other long-lived assets is determined, negatively impacting our results of operations.

Our ability to use our tax attributes to offset future income may be limited.

Our ability to use net operating losses (“NOLs”) and Section 163(j) interest expense carryforwards generated by us could be substantially limited if we were to experience an “ownership change” as defined under Section 382 of the U.S. Internal Revenue Code of 1986, as amended ("the Code"). In general, an ownership change would occur if our “5-percent shareholders,” as defined under Section 382 of the Code and including certain groups of persons treated as “5-percent shareholders,” collectively increased their ownership in us by more than 50 percentage points over a rolling three-year period. Pursuant to the Completion Agreement, Exxaro has agreed to sell down its remaining ownership interest in us in a manner that we believe will not cause us to become subject to the limitations set forth in Section 382 of the Code on the future use of the benefits of approximately $4.4 billion of NOLs and approximately $945 million of Section 163(j) interest expense carryforwards. Although we believe the Completion Agreement and the re-domiciling transaction that changed our country of incorporation from Australia to England should provide sufficient protection of our NOLs and/or Section 163(j) interest expense carryforwards, there can be no assurance that an ownership change for U.S. federal and applicable state income tax purposes will not occur in the future. A corporation that experiences an ownership change will generally be subject to an annual limitation on the use of certain pre-ownership change losses and/or credits. Such a limitation could, for any given year, have the effect of increasing the amount of our U.S. federal and/or state income tax liability, which would negatively impact our financial condition and the amount of after-tax cash available for distribution to holders of our ordinary shares if declared by our board of directors.

We could be subject to changes in tax rates, adoption of new tax laws or additional tax liabilities.

We are subject to taxation in the United States, United Kingdom, South Africa, Australia, Brazil and various other foreign jurisdictions. Our future effective tax rate could be affected by changes in statutory rates and other legislative changes, or changes in determinations regarding the jurisdictions in which we are subject to tax. From time to time, the U.S. federal, state and local and foreign governments make substantive changes to tax rules and their application, which could result in higher corporate taxes than would be incurred under existing tax law and could have an adverse effect on our results of operations or financial condition. From time to time, we are also subject to tax audits by various taxing authorities. Although we believe our tax positions are appropriate, the final determination of any future tax audits could be materially different from our income tax provisions, accruals and reserves and any such unfavorable outcome from a future tax audit could have a material adverse effect on our results of operations or financial condition.

Failure to meet some or all of our key financial and non-financial targets could negatively impact the value of our business and adversely affect our stock price.

From time to time, we may announce certain key financial and non-financial targets that are expected to serve as benchmarks for our performance for a given time period, such as, projections for our future revenue growth, Adjusted EBITDA, Adjusted diluted earnings per share and free cash flow. Our failure to meet one or more of these key financial targets may negatively impact our results of operations, stock price, and stockholder returns. The factors influencing our ability to meet these key financial targets include, but are not limited to, changes in the global economic environment relating to our TiO_2 products and zircon, changes in our competitive landscape, including our relationships with new or existing customers, our ability to introduce new products, applications, or technologies, our undertaking an acquisition, joint venture, or other strategic arrangement, and other factors described within this Item 1A – Risk Factors, many of which are beyond our control.

RISKS RELATING TO INVESTING IN OUR ORDINARY SHARES

Concentrated ownership of our ordinary shares by Cristal and Exxaro may prevent minority shareholders from influencing significant corporate decisions and may result in conflicts of interest.

As of December 31, 2020, Cristal Inorganic, an affiliate of Cristal, and Exxaro own approximately 26% and 10%, respectively, of our outstanding ordinary shares. In addition, Exxaro was previously granted a "flip in" right such that following the occurrence of certain events, Exxaro would be entitled to exchange its 26% shareholding in our South African operating subsidiaries for an additional 7.2 million ordinary shares (refer to additional information within the risk factor entitled, "We may elect to exercise certain "flip in" rights to buy-out Exxaro's 26% ownership rights in our South African subsidiaries which might negatively impact the ownership of our heavy mineral sands mining rights" below). As such, Cristal Inorganic and Exxaro may be able to influence fundamental corporate matters and transactions. This concentration of ownership, may delay, deter or prevent acts that would be favored by our other shareholders. The interests of Cristal Inorganic and Exxaro may not always coincide with our interests or the interests of our other shareholders. Also, Cristal Inorganic and Exxaro may seek to cause us to take courses of action that, in their judgment, could enhance their investment in us, but which might involve risks to our other shareholders or adversely affect us or our other shareholders.

In addition, under the shareholders agreement (the “Cristal Shareholders Agreement”) we entered into at the closing of the Cristal Transaction with Cristal, as long as Cristal Inorganic and the three shareholders of Cristal (collectively, the “Cristal Shareholders”) collectively beneficially own at least 24,900,000 or more of our ordinary shares, they have the right to designate for nomination two directors of our board of directors (the “Board”). As long as the Cristal Shareholders collectively beneficially own at least 12,450,000 ordinary shares but less than 24,900,000 ordinary shares, they have the right to designate for nomination one director of the Board. The Cristal Shareholders Agreement also provides that as long as the Cristal Shareholders collectively beneficially own at least 12,450,000 ordinary shares they have certain preemptive rights. Also, pursuant to the Cristal Shareholders Agreement, we have filed a universal shelf registration statement which is currently effective and which currently would cover 6,532,738 shares owned by Cristal as well as any shares owned by Exxaro. Other than with respect to those shares, the Cristal Shareholders Agreement includes certain restrictions on Cristal Inorganic’s ability to transfer any of its ordinary shares prior to December 31, 2022 if such transfer would cause an "ownership change" as defined under Section 382 of the Internal Revenue Code.

As a result of these or other factors, including as a result of any offering of shares by Cristal or Exxaro, or the perception that such sales may occur, the market price of our ordinary shares could decline. In addition, this concentration of share ownership may adversely affect the trading price of our ordinary shares because investors may perceive disadvantages in owning shares in a company with significant shareholders or with significant outstanding shares with registration rights.

English law and provisions in our articles of association may have anti-takeover effects that could discourage an acquisition of us by others, even if an acquisition would be beneficial to our shareholders, and may prevent attempts by our shareholders to replace or remove our current management.

Certain provisions of the U.K. Companies Act 2006 (the “Companies Act”) and our articles of association may have the effect of delaying or preventing a change in control of us or changes in our management. For example, our articles of association include provisions that:

- maintain an advance notice procedure for proposed nominations of persons for election to our board of directors;
- provide certain mandatory offer provisions, including, among other provisions, that a shareholder, together with persons acting in concert, that acquires 30 percent or more of our issued shares without making an offer to all of our other shareholders that is in cash or accompanied by a cash alternative would be at risk of certain sanctions from our board of directors unless they acted with the prior consent of our board of directors or the prior approval of the shareholders; and
- provide that vacancies on our board of directors may be filled by a vote of the directors or by an ordinary resolution of the shareholders.

In addition, public limited companies are prohibited under the Companies Act from taking shareholder action by written resolution. These provisions, alone or together, could delay or prevent hostile takeovers and changes in control or changes in our management.

Although we do not anticipate being subject to the U.K. City Code on Takeovers and Mergers, such Takeover Code may still have anti-takeover effects in the event the Takeover Panel determines that such Code is applicable to us.

The U.K. City Code on Takeovers and Mergers (the “Takeover Code”) applies, among other things, to an offer for a public company whose registered office is in the U.K. (or the Channel Islands or the Isle of Man) and whose securities are not admitted to trading on a regulated market in the U.K. (or on any stock exchange in the Channel Islands or the Isle of Man) if the company is considered by the Panel on Takeovers and Mergers (the “Takeover Panel”) to have its place of central management and control in the U.K. (or the Channel Islands or the Isle of Man). This is known as the “residency test.” The test for central management and control under the Takeover Code is different from that used by the U.K. tax authorities. Under the Takeover Code, the Takeover Panel will determine whether we have our place of central management and control in the U.K. by looking at various factors, including the structure of our board of directors, the functions of the directors and where they are resident.

Given that a majority of the members of our Board of Directors reside outside the United Kingdom, we do not anticipate that we will be subject to the Takeover Code. However, if at the time of a takeover offer, the Takeover Panel determines that we have our place of central management and control in the U.K., we would be subject to a number of rules and restrictions, including but not limited to the following: (1) our ability to enter into deal protection arrangements with a bidder would be extremely limited; (2) we might not, without the approval of our shareholders, be able to perform certain actions that could have the effect of frustrating an offer, such as issuing shares or carrying out acquisitions or disposals; and (3) we would be obliged to provide equality of information to all bona fide competing bidders.

As a public limited company incorporated in England and Wales, certain capital structure decisions requires approval of our shareholders, which may limit our flexibility to manage our capital structure.

The Companies Act generally provides that a board of directors of a public limited company may only allot shares (or grant rights to subscribe for or convertible into shares) with the prior authorization of shareholders, such authorization stating the maximum amount of shares that may be allotted under such authorization and specifying the date on which such authorization will expire, being not more than five years, each as specified in the articles of association or relevant shareholder resolution. We obtained previous shareholder authority to allot additional shares for a period of five years from February 25, 2019, which authorization will need to be renewed at least upon expiration (five years from February 25, 2019) but may be sought more frequently for additional five-year terms (or any shorter period).

The Companies Act generally provides that existing shareholders of a company have statutory pre-emption rights when new shares in such company are allotted and issued for cash. However, it is possible for such statutory pre-emption right to be disapplied by either shareholders passing a special resolution at a general meeting, being a resolution passed by at least 75% of the votes cast, or by inclusion of relevant provisions in the articles of association of the company. Such a disapplication of statutory pre-emption rights may not be for more than five years. We obtained previous shareholder authority to disapply statutory pre-emption rights for a period of five years from February 25, 2019, which disapplication will need to be renewed upon expiration (i.e., at least every five years) to remain effective, but may be sought more frequently for additional five-year terms (or any shorter period).

The Companies Act generally prohibits a public limited company from repurchasing its own shares without the prior approval of its shareholders by ordinary resolution, being a resolution passed by a simple majority of votes cast, and subject to compliance with other statutory formalities. Such authorization may not be for more than five years from the date on which such ordinary resolution is passed. We obtained previous shareholder authority to repurchase shares for a period of five years from February 25, 2019, which authorization will need to be renewed at least upon expiration (i.e., five years from February 25, 2019) but may be sought more frequently for additional five-year terms (or any shorter period).

Transfers of our ordinary shares outside The Depository Trust may be subject to stamp duty or stamp duty reserve tax in the U.K., which would increase the cost of dealing in our shares.

Except for ordinary shares received by a holder deemed to be an affiliate of us for purposes of U.S. securities laws, our ordinary shares have been issued to a nominee for The Depository Trust Company (“DTC”) and corresponding book-entry interests credited in the facilities of DTC. On the basis of current law and HM Revenue and Customs (“HMRC”) practice, no charges to U.K. stamp duty or stamp duty reserve tax (“SDRT”) are expected to arise on the issue of the ordinary shares into DTC’s facilities or on transfers of book-entry interests in ordinary shares within DTC’s facilities.

Shareholders are strongly encouraged to hold their ordinary shares in book entry form through DTC. Transfers of shares held in book entry form through DTC currently do not attract a charge to stamp duty or SDRT in the U.K. A transfer of title in the shares from within the DTC system out of DTC, including to certificate shares, and any subsequent transfers that occur entirely outside the DTC system will attract a charge to stamp duty at a rate of 0.5% of any consideration, which is payable by the transferee of the shares. Any such duty must be paid (and the relevant transfer document, if any, stamped by HMRC) before the transfer can be registered in our books. However, if those shares are redeposited into DTC, the redeposit will attract stamp duty or SDRT at the rate of 1.5% to be paid by the transferor.

We have put arrangements in place such that directly held ordinary shares cannot be transferred into the DTC system until the transferor of the ordinary shares has first delivered the ordinary shares to a depositary specified by us so that SDRT may be collected in connection with the initial delivery to the depositary. Any such ordinary shares will be evidenced by a receipt issued by the depositary. Before the transfer can be registered in our books, the transferor will also be required to put the depositary in funds to settle the resultant liability to SDRT, which will be charged at a rate of 1.5% of the value of the shares.

Our articles of association provide that the courts of England and Wales have exclusive jurisdiction to determine any dispute brought by a shareholder in that shareholder's capacity as such and certain other matters.

Our articles of association provide that the courts of England and Wales have exclusive jurisdiction to determine any dispute brought by a shareholder in that shareholder's capacity as such, or related to or connected with any derivative claim in respect of a cause of action vested in us or seeking relief on our behalf, against us and/or the board and/or any of the directors, former directors, officers, employees or shareholders individually, arising out of or in connection with our articles of association or (to the maximum extent permitted by applicable law) otherwise. This choice of forum provision may limit a shareholder's ability to bring a claim in a judicial forum that the shareholder believes is favorable for disputes with us or our directors, former directors, officers, employees or shareholders which may discourage lawsuits against us and our directors, former directors, officers, employees or shareholders.

There may be difficulty in effecting service of legal process and enforcing judgments against us and our directors and management.

We are incorporated under the laws of England and Wales and a substantial portion of our assets are located outside of the U.S. The U.S. and the U.K. do not currently have a treaty providing for the recognition and enforcement of judgments, other than arbitration awards, in civil and commercial matters. The enforceability of any judgment of a U.S. federal or state court in the U.K. will depend on the laws and any treaties in effect at the time, including conflicts of laws principles (such as those bearing on the question of whether a U.K. court would recognize the basis on which a U.S. court had purported to exercise jurisdiction over a defendant). In this context, there is doubt as to the enforceability in the U.K. of civil liabilities based solely on the federal securities laws of the U.S. In addition, awards for punitive damages in actions brought in the U.S. or elsewhere may be unenforceable in the U.K.. An award for monetary damages under U.S. securities laws would likely be considered punitive if it did not seek to compensate the claimant for loss or damage suffered and was intended to punish the defendant.

Item 1B. Unresolved Staff Comments

Not applicable.

Item 2. Properties

Below are our primary offices and facilities at December 31, 2020. We believe our properties are in good operating condition, and are well maintained. Pursuant to separate financing agreements, substantially all of our material U.S., European and Australian properties are pledged or encumbered to support or otherwise provide security for our indebtedness.

Our primary office locations consisted of the following:

Location	Owned/Leased	Offices
Stamford, Connecticut	Leased	263 Tresser Boulevard, Suite 1100
Stallingborough, United Kingdom	Leased	Laporte Road
New York, New York	Leased	410 Park Avenue
Oklahoma City, Oklahoma	Owned	3301 NW 150 Street

Mining Operations

Tronox owns and operates five mining-mineral processing supply chains, each including one or more heavy mineral sand ("HMS") mines producing heavy mineral concentrate ("HMC") to feed a dedicated mineral separation plant. Two operations are in South Africa: Namakwa Sands, Western Cape, and KZN Sands, KwaZulu-Natal. Three operations are in Australia: our Northern Operations and Southern Operations are in the coastal plain of Western Australia; and our Eastern Operations are in the New South Wales portion of the Murray Basin, Australia.

In South Africa, the Namakwa Sands operations include two open-pit mines, each with a dedicated primary concentration plant, and a secondary concentration plant at Brand-se-Baai, a mineral separation (“dry”) plant at Koekenaap, and a two-furnace smelter at Saldanha, Western Cape, South Africa. The KZN operations have an open pit mine at Fairbreeze with a primary concentration plant, a mineral separation plant at Empangeni alongside a two-furnace smelter complex, and export facilities at the port of Richards Bay.

The Western Australia operations are in two supply chains: the North Perth Basin, consisting of the Cooljarloo dredge mine and floating heavy mineral concentration plant, and the Chandala metallurgical complex near Muchea, consisting of a mineral separation plant and a synthetic rutile ("SR") plant; and the South Perth Basin, consisting of a dry open pit mine at Wonnerup with primary concentration of HMC and a mineral separation plant at Bunbury.

The Eastern Operations in the Murray Basin of Australia include two operating dredge mines at Ginkgo and Snapper and a mineral separation plant at Broken Hill, NSW.

Pigment Operations

Our pigment facilities consist of the physical assets necessary and appropriate to produce, distribute and supply our TiO_2 products and consist mainly of manufacturing and distribution facilities. The following table lists our TiO_2 production facilities and capacity (in metric tonnes per year), by location:

Facility	Production	TiO2 Capacity	Process
Hamilton, Mississippi, USA	TiO_2	225,000	Chloride
Yanbu, Saudi Arabia	TiO_2	200,000	Chloride
Stallingborough, England, United Kingdom	TiO_2	165,000	Chloride
Kwinana, Western Australia	TiO_2	150,000	Chloride
Kemerton, Western Australia	TiO_2	110,000	Chloride
Botlek, the Netherlands	TiO_2	90,000	Chloride
Salvador, Bahia, Brazil	TiO_2	60,000	Sulphate
Fuzhou, Jiangxi Province, China	TiO_2	46,000	Sulphate
Thann, Alsace, France	TiO_2	32,000	Sulphate

We believe we have maintained a level of adequate provision for the current and near-term use of our plants and equipment, the costs of which are recorded as Property, plant and equipment on our consolidated balance sheets; see Note 11 of our notes to our consolidated financial statements. We utilize local power sources at each of our sites; see "Risk Factors—South Africa, where we have large mining assets and derive a significant portion of our revenue and profit, poses distinct operational risks which could affect our business, financial condition and results of operations."

Mineral Properties

As of December 31, 2020, we owned mining rights to ore reserves described herein at five heavy mineral sands operations in South Africa and Australia, where we mine heavy mineral sands to supply titanium mineral feedstock to our TiO_2 manufacturing business and co-products for external sale.

Reporting of Ore Reserves

SEC reporting companies are required to report ore reserves under SEC Industry Guide 7 of the Securities Act of 1933, "Description of Property by Issuers Engaged or To Be Engaged in Significant Mining Operations". Industry Guide 7 ("IG7") requires that sufficient technical and economic studies have been completed to reasonably assure economic extraction of the declared reserves, based on the parameters and assumptions current to the end of the reporting period.

Tronox operations personnel have for years followed SAMREC (South African Code for the Reporting of Exploration Results, Mineral Resources and Mineral Reserves) and JORC (Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves) guidelines to internally update our year-end mineral reserve and mineral resource estimates.

Our mineral reserve estimates are based on geological resource models modified by various mining and processing factors and assessed in a techno-economic model for commercial viability. This constitutes a Life-of-Mine-Plan (LOMP) for each operation. These LOMP's have been developed by teams of Tronox professionals with diverse, complementary skills and an intimate knowledge of their respective operations. A LOMP takes into account the mineral reserves and resources, realistic assumptions of geological, mining, metallurgical, economic, marketing, legal, environmental, social, governmental, engineering, operational and all other modifying factors in sufficient detail to demonstrate at the time of reporting that extraction is reasonably justified. Our mineral reserve estimates are subject to internal controls to ensure their accuracy and validity.

Proven Reserves have a higher level of confidence than *Probable Reserves*. Not all HMS deposits are alike, and resources with internal variability in grade, HM ("heavy mineral") assemblage, or other characteristics are not classified as reserves until sufficient drilling density and statistical validation improves our level of confidence in the estimates. The heavy mineral reserves table below is a summary of Reserves determined as economically-exploitable by individuals certified under SAMREC or JORC disclosure guidelines as "Competent Persons" or "Qualified Persons," to prepare mineral resource and reserves estimates. No "qualified person" requirement exists under IG7 rules.

Mining and Mineral Tenure

Industry Guide 7 requires us to describe our rights to access and mine the minerals we report as ore reserves and to disclose any change in mineral tenure of material significance. Our heavy mineral exploration and mining activities in South Africa and Australia are regulated by the South African Department of Mineral Resources, the Western Australia Department of Mines, Industry Regulation and Safety and the New South Wales Department of Planning, Industry and Environment. All exploration and mining activities are subject to multiple levels of environmental regulatory review, including approvals of environmental plans and public comment periods as pre-conditions to granting of mineral tenure.

Mineral Tenure - South Africa

Our two South African mineral sand mining processing chains are operated by Namakwa Sands and KZN Sands, both business units of Tronox Holdings plc. The South African Department of Mineral Resources and Energy (“DMRE”) is the regulatory administrator of mineral rights in South Africa, subject to the provisions of the Mineral and Petroleum Resources Development Act (“MPRDA”), No. 28 of 2004, as amended in 2016. The MPRDA vests all mineral rights in South Africa in the national government and establishes conditions for the acquisition and maintenance of prospecting and mining rights. Prospecting rights and mining rights may only be granted by the DMRE. Prospecting rights are granted for a maximum period of five years and can be renewed once for an extension of up to three years. Prospecting rights may be revoked for non-compliance with the terms of the prospecting right.

Mining right applications require additional approvals by the Department of Environmental Affairs (“DEA”) of an Environmental Management Program (“EMP”) and an Integrated Water and Land Use License. Our South African operations are 74%-owned by Tronox through its subsidiaries, Tronox Mineral Sands (Pty) Ltd and Tronox KZN Sands (Pty) Ltd, with the remaining 26% being owned by Exxaro, subject to our "flip-in" rights described elsewhere in this Annual Report on Form 10-K.

Mining rights are valid for up to 30 years and may be extended by 30-year renewals, subject to compliance with conditions established in the EMP and by the MPRDA. Environmental permitting and compliance are co-administered by the regional offices of DEA and Development Planning. All rights, licenses and permits for Namakwa Sands and KZN Sands are in good standing.

Tronox holds mining rights over an area of 19,205 hectares (47,457 acres) and surface rights totaling 17,111 hectares (43,542 acres) at the active mining site near Brand-se-Baai.

Tronox also controls mining and prospecting rights in KwaZulu-Natal Province, on South Africa’s Indian Ocean coast, through Tronox KZN Sands (Pty) Ltd, a subsidiary of Tronox. Mining Authorizations cover approximately 4,041 hectares (9,986 acres) at Fairbreeze, where surface access rights are either owned directly by KZN Sands or secured by agreements with Mondi Ltd. A further 4,790 hectares (11,836 acres) of prospecting rights are held by KZN Sands at the nearby Port Durnford and Waterloo project areas.

Mineral Tenure - Australia

Our Australian mineral properties are divided into the Northern and Southern Operations of the Swan Coastal Plain of Western Australia and the Eastern Operations of the Murray Basin in New South Wales and Victoria. Mining tenements in Australia are managed at the State or Territorial level. In Western Australia, Mining Leases, Exploration Licenses and Retention Licenses are granted and administered by the Western Australian Department of Mines, Industry Regulation and Safety, and in New South Wales by the NSW Department of Planning, Industry and Environment, under the authority of the Western Australian Mining Act 1978 and the New South Wales Mining Act 1992, respectively. Principal environmental authorities are the Western Australian Department of Water and Environmental Regulation and the NSW Environment Protection Authority.

In the North Perth Basin, Western Australia, Tronox controls mining leases, exploration and other licenses and rights covering a total 50,838 hectares (125,623 acres). Mining and Public Environmental Review plans are approved for the Cooljarloo mine and the planned Dongara mine. Environmental Protection Agency approval of Cooljarloo West is anticipated during 2021. The main Cooljarloo deposit covers 9,744 hectares (24,078 acres). We hold 14 mining leases at the Dongara project. Three older mining leases are held at our Jurien property, the site of a former heavy minerals open pit mine operated by another party in the 1970’s.

Under the Cristal Transaction, Tronox acquired mining and exploration licenses in the South Perth Basin and Murray Basin heavy mineral provinces of Australia. Many of these mining properties were originally acquired by Cable Sands Pty Ltd, starting in the 1950’s, and some mineral tenure remains under Cable Sands as a Tronox subsidiary. The acquisition of Cable by Bemax in 2004, Bemax by Cristal in 2008, and Cristal by Tronox in 2019 transfers these assets and a rich legacy of innovation in heavy mineral mining and processing as well as responsible environmental stewardship to Tronox.

The Southern Operations in the southwest of Western Australia comprises 30 mining leases, 5 exploration licenses, 3 retention licenses, 2 general purpose leases and 2 miscellaneous licenses totaling 16,178 hectares.

Tronox holds 4 mining leases, 14 exploration licenses, 2 retention licenses, and 1 Exploration License Application in our Eastern Operations in the Murray Basin of New South Wales, Victoria and South Australia. The tenements cover about 524,400 hectares (2,025 sq miles). Three mining leases west of Pooncarie, NSW cover about 6,720 hectares (16,605 acres) surrounding our active mines at Ginkgo, Snapper and Crayfish. One mining lease of 2,330 hectares is at the Atlas/Campaspe project, NSW.

Mineral Sands - South Africa and Australia

HMS deposits are natural concentrations of granular minerals of high densities (conventionally above about 2.85 gm/cm3). The heavy mineral assemblage of a particular HMS deposit generally reflects the HM contained in local and regional source rocks, and titanium-rich HMS deposit source rocks are typically granitic and/or high-grade metamorphic crystalline rocks. Factors that influence the formation of HMS deposits include erosion of crystalline source rocks, fluvial transport to the coastline, longshore drift, coastal geomorphology, deposition of heavy minerals, and prolonged natural sorting of heavy minerals by water and wind, according to the density, size and shape of HM grains. Post-depositional geological processes that can affect the economic viability of a HMS deposit include in situ weathering, induration of the host sands, and natural preservation or destruction of the HMS deposit.

Not all heavy minerals have commercial value, and a distinction is made between the Total Heavy Minerals (“THM”) and Valuable Heavy Minerals (“VHM”). Typical VHM assemblages include the titanium-iron oxide mineral, ilmenite ($FeTiO_3$); rutile, a premium titanium mineral (TiO_2), leucoxene, a naturally-upgraded variety of ilmenite; and zircon, a zirconium silicate (ZrSiO4) valuable for its use in a diverse range of industrial and construction applications. Other HM of commercial value, such as garnet, staurolite, kyanite and monazite, may be recovered as by-products.

Our TiO_2 business explores, acquires, mines and processes heavy mineral sands to produce concentrates of titanium minerals and VHM co-products, particularly zircon. HMC from primary concentration at our mines are transported to our integrated mineral separation plants (MSP) to separate and concentrate VHM by gravity, magnetic and electrostatic techniques. Multiple grades of titanium minerals and zircon may be produced from each MSP. We upgrade ilmenite into titanium slag at our two South African operations and SR at our Chandala metallurgical complex in Western Australia. Our captive titanium mineral products provide a secure, long-term low-cost supply of high-grade feedstock for our TiO_2 manufacturing facilities.

Our mineral property disclosures express grade in terms of the percentage of THM by weight in the ore and VHM as percentages of ilmenite, rutile + leucoxene, and zircon in the heavy mineral assemblage. Our Reserve estimates are based solely upon the value of recoverable zircon, rutile, ilmenite and leucoxene.

In 2020, we produced concentrates of ilmenite, rutile, leucoxene, and zircon from five operations: Namakwa Sands, Western Cape, South Africa; KZN Sands, KwaZulu-Natal, South Africa; Northern Operations, Western Australia, Southern Operations, Western Australia; and Eastern Operations, Murray Basin, New South Wales, Australia. Ilmenite from our Namakwa and Fairbreeze mines in South Africa is converted to titanium slag at our smelters at Saldanha Bay Western Cape and Empangeni, KwaZulu-Natal, respectively. Ilmenite from our Cooljarloo mine in Western Australia is converted to SR at our Chandala metallurgical complex and is most commonly used as feedstock to our TiO_2 pigment plants at Kwinana and Kemerton south of Perth. Our vertically integrated mining-processing operations satisfy a significant majority of feedstock requirements for our nine TiO_2 manufacturing facilities in the United States, The Netherlands, France, the United Kingdom, Brazil, Saudi Arabia, China and Western Australia.

TRONOX MINERAL SAND - MINERAL PROCESSING CAPACITIES - (metric tonnes per year)

Product	Namakwa Sands RSA	KZN Sands RSA	Northern Ops W.A.	Southern Ops W.A.	Eastern Ops NSW	Total
Rutile(1)	30,000	25,000	35,000	12,000	80,000	182,000
Synthetic rutile	—	—	230,000	—	—	230,000
Titanium slag	190,000	220,000	—	—	—	410,000
Pig Iron	100,000	120,000	—	—	—	220,000
Zircon(2)	125,000	55,000	40,000	12,000	65,000	297,000

(1) includes natural rutile + leucoxene
(2) includes multiple grades of zircon
The data are generalized to reflect current mining and processing capabilities, and may differ slightly from design capacities.
Some ilmenite production concentrates are consumed internally without beneficiation to slag or SR while others are sold commercially.

Namakwa Sands, Western Cape, South Africa

Our heavy mineral sand operations in South Africa include similar material flows from integrated mine-mineral separation-smelter value chains on the west and east coasts of South Africa. Both Namakwa, Western Cape and KZN Sands, KwaZulu-Natal produce smelter products of titanium slag and pig iron from ilmenite, plus commercial grades of zircon and high-grade rutile + leucoxene concentrates.

The Namakwa Sands heavy mineral deposit at Brand-se-Baai was discovered in 1986 by Anglo American, which commissioned the integrated mine-MSP-smelter project in 1995. Ore is excavated from two open-pit dry mines and delivered by trucks and conveyors to two primary wet concentration plants. Heavy Mineral Concentrate is separated into magnetic and non-magnetic fractions at a secondary concentration plant at the mine. The two fractions are further processed at a mineral separation plant ("dry mill") 52 km south at Koekenaap. Ilmenite, rutile and zircon are transported by rail from Koekenaap to Saldanha Bay, where ilmenite is smelted in a two-furnace complex into titanium slag and pig iron. Chloride-grade slag, slag fines, pig iron, rutile and zircon are exported from our proprietary facilities at the Saldanha Bay deep-water port, about 150 km north of Cape Town.

Namakwa Sands reserve estimates as of December 31, 2020, in accordance with SAMREC (2016) reporting standards, are: 44 million tonnes in-place HM, containing over 21 million metric tonnes ilmenite, 4.6 million tonnes zircon, and 4.5 million tonnes rutile and leucoxene from 727 million tonnes of ore. These estimates reflect a 3.6% net decrease of in-place THM from the December 31, 2019 reserves estimate, due primarily to mine depletion. The current mining rate varies between 20 and 25 million tonnes of ore per annum from two open-cut mines in adjacent ore bodies known as the Graauwduinen West and Graauwduinen East deposits.

The Namakwa Sands HM deposit occupies an ellipsoidal area of 15 kilometers northeasterly by 4 km wide and is interpreted to be an ancient dune complex shaped by prevailing winds at the time of its formation. Repetitive cycles of erosion from crystalline source rock, fluvial transport and prolonged reworking by water and wind formed the deposit.

The Namakwa Sands heavy mineral assemblage is heterogeneous, creating challenges to efficient recovery of valuable heavy minerals. Significant amounts of low-value heavy minerals in the Namakwa HM assemblage include: garnet, pyroxene, hematite, magnetite, and kyanite. Most of the ore reserves are hosted by a complex dune sand sequence over 40 meters thick, known as the Orange Feldspathic Sand ("OFS"). The OFS is significantly affected by the formation of hard duricrust layers and lenses, interpreted to be a chemical precipitate of variable amounts of silicon (Si), calcium (Ca), magnesium (Mg), iron (Fe), aluminum (Al) and other constituents from alkaline groundwater. The duricrust is superimposed upon HM-bearing strata and adversely affects VHM recoveries. Additional reserves are hosted at the surface by a sheet-like layer of iron oxide-stained, wind-blown sand known as the red aeolian sand (RAS). Little overburden is present.

Adjustments to our geotechnical-economic modelling and a comprehensive metallurgical program have enabled division of the West and East deposits into multiple geological domains based on mineralogical and processing characteristics. A better understanding of the Namakwa deposit has led to improvements in liberation and recoveries of VHM.

KZN Sands, KwaZulu-Natal, South Africa

Our KZN Sands integrated mining-processing operation was commissioned by Iscor Heavy Minerals, predecessor to the Mineral Sands division of Exxaro Resources Ltd, which merged with Tronox in 2012. KZN Sands operates the open-cut Fairbreeze mine, 8 km south of the coastal town of Mtunzini, the Central Processing Complex, 30 km west of Richards Bay, and bulk export facilities at the port of Richards Bay.

The Fairbreeze deposit is hosted by deeply weathered "Berea-type" sands which are mined using a combination of track dozers and a hydraulic mining technique that was pioneered for HMS mining at our Hillendale mine, where rehabilitation is now complete. High-pressure water jets disaggregate the fine-grained sand into a slurry that is pumped to a primary wet plant to produce heavy mineral concentrate, which is hauled by truck 45 km to the Empangeni CPC for separation into commercial zircon and rutile concentrates, and ilmenite feed for the adjacent two-furnace smelter. Except for local consumption of some pig iron, all saleable products are exported from Richards Bay, including high-grade titanium feedstocks for our TiO_2 pigment plants.

The Fairbreeze deposit is hosted by a complex of strandline/paleo-dune couplets, about two kilometers inland from the modern coastline, forming an elongate ridge extending about 12 km south-southwesterly from the town of Mtunzini with a maximum width of about two kilometers. No overburden is present. Modern erosion has dissected the deposit into five discrete ore bodies. The Fairbreeze dune complex is part of a regional, coast-parallel corridor of terraces and dunes collectively known as the Berea Red Sands that formed along the southeastern coast of Africa from Durban to Mombasa, in response to static sea levels of the Pliocene-Pleistocene. As with all heavy mineral sand deposits, iron-titanium oxides, rutile, zircon and other minerals in the HM assemblage at Fairbreeze are inherited from their source rock provenance and modified by selective sorting during deposition. Probable source rocks for the HM are the Natal Metamorphic Province and younger rift-related basalts.

Reserve estimates for KZN Sands as of December 31, 2020 in accordance with SAMREC (2016) reporting standards, are: 225 million tonnes ore averaging 5.6% total heavy minerals. Reserves were depleted by mining of 9 million tonnes in 2020, and increased by about one million tonnes, for a net decrease of about eight million tonnes ore and 0.7 million tonnes in-place THM from our 2019 reserves. The remaining ore contains approximately 7.7 Mt ilmenite, 1.0 Mt zircon, and 0.9 Mt rutile and leucoxene.

Northern Operations, Western Australia

Our mineral properties of the coastal plain of Western Australia are located within two historically important heavy mineral provinces. Our combined Cooljarloo dredge mine and planned Cooljarloo West dredge mine, 170 km north of Perth, contain proven and probable reserves of 6.5 million tonnes in-place HM. Reserves at our future Dongara mine, about 65 km southeast of Geraldton, are 3.4 million tonnes of in-place HM.

Our Cooljarloo mine and Chandala MSP and SR facility, 170 km and 65 km, respectively, north of Perth, started production in 1989 as part of the Tiwest Joint Venture, an integrated mine-to-pigment enterprise between Kerr-McGee Chemical Corp and Minproc Ltd. Subsequent reorganizations of both partners led to 100% ownership of Tiwest under Tronox in 2012.

Two dredges in a single pond feed an ore slurry to a floating concentrator to produce HMC, which is hauled by trucks 110 km south to our Chandala metallurgical complex near Muchea, 60 km north of Perth, for the recovery of ilmenite, rutile, leucoxene and zircon. Ilmenite is upgraded at Chandala to SR, a high-TiO_2 feedstock for our Kwinana and other TiO_2 pigment plants

Cooljarloo reserves as of December 31, 2020 are 361 million tonnes of ore, containing 6.5 million tonnes of in-place heavy minerals. The mining of low-grade ore at Cooljarloo is supported by economies of scale, low-cost dredging, a high-quality VHM suite that constitutes nearly 80% of THM, and good processing characteristics of the ilmenite in its conversion to SR. Upon exhaustion of Cooljarloo ore, the dredge mine will be relocated to Cooljarloo West, where reserves from three-ore bodies contain an estimated 2.6 million tonnes of in-place heavy minerals.

At Dongara, multiple feasibility studies, drilling, and dry-mining optimization over the past 15 years identify reserves of 68 million tonnes ore at an average grade of 5.1% THM in five deposits, for which mining and environmental approvals have been secured.

Heavy mineral deposits of our Northern Operations generally occur as stacked, elongate, NNW-trending bodies parallel to the modern coastline, bounded to the east by the Gingin Scarp. A swarm of HM deposits in the Cooljarloo district span an area of 40 km NNW by a width of over 5 km. Heavy minerals derived from the crystalline “basement” of the Yilgarn craton east of the scarp and Mesozoic sediments of the North Perth Basin west of the scarp are associated with marine still-stands on a wave-cut platform, as HM sands accumulated in shoreline, dunal and other coastal environments of a westward-regressing seacoast.

As of December 31, 2020, our total Northern Operations reserves are estimated at 9.9 million tonnes of in-place heavy minerals, including approximately 5.7 million tonnes ilmenite, 1.1 million tonnes zircon, and about 830,000 combined tonnes of rutile and leucoxene. The Cooljarloo Reserve decreased by 56 million tonnes which comprises 32 million tonnes of mine depletion and sterilization and the removal of 23 million tonnes of ore from the existing reserve, for a net decrease of 14.5% in-place THM from our 2019 year-end reserves.

Southern Operations, Western Australia

Our mineral properties in the South-West of Western Australia were acquired in the Cristal Transaction in 2019. Mining in the Capel heavy mineral province began in 1956 by Cable Sands Pty Ltd, acquired in 2004 by Bemax Resources Ltd, which in turn was acquired by Cristal in 2008. Most mineral properties, licenses and permits in our Southern Operations are held under Cable Sands, now a Tronox subsidiary.

We extract heavy minerals from the Wonnerup North open-cut HMS mine, 10 km east of Busselton, from which HMC is trucked to our MSP at Bunbury, adjacent to the Bunbury port. Most of our reported Reserves of approximately 1 million tonnes of in-place total heavy minerals as of December 31, 2020 are in the Wonnerup North deposit. The Bunbury MSP also processes streams of HM concentrates sorted by their magnetic susceptibilities from our Broken Hill MSP in New South Wales.

The Wonnerup North deposit is a shallow (~3m deep) windblown dunal deposit on the Capel paleo-shoreline, one of two strandlines, along with the Yoganup paleo shoreline, located 7 km and 15 km inland, respectively, from the modern Indian Ocean coast associated with most of the economic HMS deposits of the region. Mining commenced at Wonnerup North in June 2019 after the completion of mining at Wonnerup South. All HMC was fed to our Bunbury MSP for recovery of commercial mineral concentrates.

Ilmenite-dominant heavy mineral deposits of the South Perth Basin occur as multiple, arcuate bands, parallel to the J-shaped Geographe Bay modern shoreline. These “fossil” shorelines become progressively younger from east-to-west, reflecting HM accumulations on paleo-beaches as the sea regressed across the Swan Coastal Plain during the Late Pliocene-Pleistocene. Ore controls include: proximity of the Yilgarn Craton, the provenance for the heavy minerals geomorphology of the Geographe Bay coast, and high-energy waves that concentrated HM and winnowed out quartz and other diluting minerals on paleo-shorelines of a wave-cut platform.

Eastern Operations, Murray Basin, New South Wales, Australia

Our Eastern Operations, acquired in the Cristal Transaction, are located in the Murray Basin, a 300,000-square-kilometer intra-cratonic sedimentary basin covering parts of Victoria, New South Wales, and South Australia. Our operating mines at Ginkgo, Crayfish and Snapper are about 40 km west of Pooncarie, New South Wales. Dredge mining commenced at Ginkgo in 2006, and at Snapper in 2010. Dry-mining at Crayfish, a small deposit adjunct to Ginkgo, started in September 2019, from which ore is hauled to the Ginkgo dredge pond.

Economic concentrations of heavy minerals in the Murray Basin are found in sandy sediments associated with Pliocene coastal sand deposits, formed during marine still-stands. Higher heavy mineral grades occur as parallel, linear bands that reflect HM accumulations on paleo-strandlines. Overburden at our Ginkgo and Snapper mines is removed by conventional mining methods, followed by dredge mining of ore.

HMC from Ginkgo-Snapper is hauled by trucks approximately 240 km to our MSP in Broken Hill, NSW. The Broken Hill MSP utilizes magnetic separation techniques to produce commercial concentrates of ilmenite and leucoxene, and a non-magnetic HM concentrate. The products are railed about 430 km to the port of Adelaide, South Australia. The non-magnetic concentrates are shipped to the Bunbury MSP for further processing into final products.

HMC production from our Eastern Operations for 2020 was approximately 400,000 tonnes. At current production rates, mining is scheduled to be completed at Snapper in 2022 and at Ginkgo/Crayfish in 2023.

Government consent has been obtained for the development of two new open-cut dry mines at our Atlas/Campaspe project, 90 km north of Balranald, NSW and approximately 270 km southeast of Broken Hill. Starting with Atlas in 2022, the new production will be phased in to sustain VHM output from our Eastern Operations, as Ginkgo/Crayfish and Snapper reach depletion. HMC produced on-site at Atlas and Campaspe by wet gravity and magnetic (WHIMS) separation will be delivered to the Broken Hill MSP via a combination of road and rail transport. Current estimated reserves at Atlas/Campaspe are 5.7 million tonnes (Mt) of in-place THM, including 4.1 Mt titanium minerals and over 700,000 tonnes zircon from 88 Mt ore. Approximately 19 million tonnes of ore was mined during 2020 from Snapper, Ginkgo and Crayfish. Active exploration programs are ongoing in the Murray Basin heavy minerals province, where our exploration licenses cover nearly 5,100 square kilometers.

Our total heavy mineral reserves at December 31, 2020 in our Eastern Operations, including the Ginkgo, Crayfish, Snapper, Atlas and Campaspe HMS deposits, are 145 million tonnes of ore containing 7.0 million tonnes of in-place heavy minerals.

Vertical Integration

Our TiO_2 value chain is the largest vertically-integrated TiO_2 value chain in the world, and our TiO_2 business is the world’s only mining-mineral processing chain with production of both titanium slag and synthetic rutile. Our South African slag, Australian synthetic rutile, and natural rutile from multiple mining-processing operations satisfy a significant majority of our internal TiO_2 feedstock requirements.

There is a high degree of substitutability among natural rutile, synthetic rutile, and titanium slag as titanium feedstocks for chloride pigment production. The commercial value of titanium feedstock is a function not only of TiO_2 content and supply and demand balances, but is also influenced by particle size, trace element geochemistry, logistics and other factors. The global TiO_2 industry is a value-added supply chain, with final product prices for TiO_2 pigment, typically more than 10x higher than that of ilmenite, the backbone of the global titanium mineral supply. The revenue assumptions for titanium feedstocks applied in the determination of heavy mineral ore reserve estimates are based on market intelligence gathered from internal and external experts, sales contracts and historic pricing.

Our LOMP and reserve estimates are derived from detailed techno-economic models created from extensive geological, mining and analytical databases, and optimized with respect to anticipated revenues and costs. Cost assumptions are developed from our extensive experience and include mining parameters, processing recoveries, foreign exchange, and rehabilitation. Each of our operations reconcile predicted mining and processing metrics with actual production and recovery data on a monthly basis. Our models are updated as necessary and used to determine ore boundaries based on economic assumptions. To satisfy the disclosure rules in Industry Guide 7, the nominal cut-off grades used to calculate ore reserves are, generally: 0.2% zircon at Namakwa Sands; 1.5% ilmenite at KZN Sands; 1.3% THM (approximately 1% VHM) at our Northern Operations, Western Australia, 3% THM at our Southern Operations, Western Australia, and 1% THM at our Eastern Operations, Murray Basin, Australia. Actual cut-off grades applied in reserve estimates can vary according to numerous factors, such as mining method, overburden: ore ratios, and HM assemblage quality.

Heavy Mineral Reserves

Ore reserves are those portions of mineral deposits that are economically and legally exploitable at December 31, 2020. All of our heavy mineral reserves are reported on the basis of in-place, economically extractable ore, determined from comprehensive geological, mining, processing and economic models. Reserve classifications of *Proven* or *Probable* are based on the level of confidence in the reserve estimates.

The following table summarizes our heavy mineral ore reserves and their contained in situ THM and heavy mineral assemblages as of December 31, 2020. Increases or decreases in our reserves estimates from December 31, 2019 to December 31, 2020 are indicated as a percent of in-place THM reserves.

					VHM Assemblage (% of THM)			
MINE / DEPOSIT	**Reserve Category**	**Ore (million tonnes)**	**Average Grade (% THM)**	**In-Place THM (million tonnes)**	**Ilmenite**	**Rutile and Leucoxene**	**Zircon**	**Change from 2019 + (-) %**
Namakwa Sands Dry Mine - Western Cape RSA								
	Proven	144	8.2 %	11.8	36.4	8.0	8.9	
	Probable	583	5.5 %	32.1	52.6	11.0	11.2	
	Total Reserves	**727**	**6.0 %**	**43.9**	**48.2**	**10.2**	**10.5**	**(3.6)%**
KZN Sands Hydraulic Mine KwaZulu-Natal RSA								
	Proven	214	5.7 %	12.2	61.7	7.3	7.7	
	Probable	11	3.7 %	0.4	52.0	5.0	7.0	
	Total Reserves	**225**	**5.6 %**	**12.6**	**61.4**	**7.2**	**7.7**	**(5.2)%**
Cooljarloo – Dredge Mine Western Australia								
	Proven	230	1.7 %	3.9	61.9	7.9	10.6	
	Probable	131	2.0 %	2.6	60.5	8.3	12.2	
	Total Reserves	361	1.8 %	6.5	61.3	8.1	11.2	(14.5)%
Dongara Planned Dry Mine Western Australia								
	Proven	68	5.1 %	3.4	49.5	8.9	10.9	
	Probable	—	— %	—	—	—	—	
	Total Reserves	68	5.1 %	3.4	49.5	8.9	10.9	— %

Northern Operations	**Total Reserves**	**429**	**2.3%**	**9.9**	**57.2**	**8.4**	**11.1**	**(10.0)%**
Wonnerup Dry Mine Western Australia								
	Proven	14	5.4 %	0.8	70.1	18.7	9.8	
	Probable	5	5.6 %	0.3	78.1	10.8	8.7	
	Total Reserves	19	5.4 %	1.0	72.2	16.7	9.5	(11.6)%
Southern Operations	**Total Reserves**	**19**	**5.4%**	**1.0**	**72.2**	**16.7**	**9.5**	**(11.6)%**
Ginkgo-Snapper Dredge/ Dry Mines, New South Wales Australia								
	Proven	57	2.1 %	1.2	41.5	29.2	12.2	
	Probable	—	—	—	—	—	—	
	Total Reserves	57	2.1 %	1.2	41.5	29.2	12.2	(21.5)%
Atlas-Campaspe Dry Mine in Development, New South Wales Australia								
	Proven	—	— %	—	—	—	—	
	Probable	88	6.5 %	5.7	56.1	16.0	12.3	
	Total Reserves	88	6.5 %	5.7	56.1	16.0	12.3	— %
Eastern Operations	**Total Reserves**	**145**	**4.8%**	**7.0**	**53.5**	**18.3**	**12.3**	**(4.6)%**
Global	**Total Reserves**	**1,545**	**4.8%**	**74.4**	**52.5**	**10.3**	**10.3**	**(4.5)%**

Abbreviations, Definitions, and Notations

One metric tonne = 1.10231 short tons

Ore Reserves —mineralized material inclusive of dilution, determined to be economically and legally exploitable as of December 31, 2020, classified as either *Probable Reserves or Proven Reserves*, based on level of confidence.

THM — total heavy minerals, densities >2.85 g/cm3 regardless of commercial value

VHM — valuable heavy minerals, including Ilmenite, Rutile, Leucoxene & Zircon, reported as percentage of THM.

Change from 2019 — Increase (decrease) in percent change of in-place THM from 2019
Minor computational discrepancies may be due to rounding
Cooljarloo Dredge Mine reserves include Cooljarloo and Cooljarloo West

Key Assumptions — economic viability is determined by techno-economic modeling that integrates geological, analytical and geotechnical databases, mining parameters, metallurgical recoveries, known or forecast operating costs, cost of capital, and product sales prices at time of production. Historical sales prices by themselves are unreliable predictors of future prices, and our forecasts are based on our private contracts, internal and external market research.

Disclosures of mineral reserves traditionally include a cut-off grade, the grade in a mineral deposit below which material cannot be profitably mined and processed. However, economic exploitability is determined by many modifying factors other than grade, and most modern mining operations, including ours, use detailed computer models utilized by employees who possess the experience and technical expertise to identify what parts of a deposit are economically exploitable. As cut-off grades remain entrenched in the mining industry, the following nominal cut-off grades apply, with qualifications, to our five operations: 0.2% zircon at Namakwa Sands; 1.5% ilmenite at KZN Sands; 1.3% THM (approximately 1% VHM) at our Northern Operations, WA, 3% THM at our Southern Operations, WA, and 1% THM at our Eastern Operations, NSW.

Production forecasts of commercial-quality titanium mineral and zircon concentrates from reserves are taken from our Life-of-Mine Plans. Mining recoveries are typically close to 100%, but metallurgical recoveries in each concentration step can vary widely, as a function of ore and mineral characteristics. We apply recovery factors based on actual operating data. Unrecovered VHM in certain dry mill tailings streams are stockpiled, but their hypothetical value is not considered in our revenue assumptions.

Mineral reserve estimates, life-of mine projections, and revenue assumptions are inherently forward-looking and subject to market conditions, uncertainties and unanticipated events beyond our control.

The following table compares the heavy mineral reserves reported for the three years ending December 31, 2020, 2019 and 2018, expressed as millions of metric tonnes of in-place total heavy minerals:

3-Year Reserves (Mt In-Place THM)

	December 31,		
	2020	2019	2018
	(In millions of metric tonnes)		
Namakwa Sands	43.9	45.6	40.8
KZN Sands	12.6	13.2	14.1
Total South Africa	**56.5**	**58.8**	**54.9**
Northern Ops, W. Australia	9.9	10.9	11.2
Southern Ops, W. Australia	1.0	1.2	N/A
Eastern Ops, Murray Basin Australia	**7.0**	7.2	N/A
Total Australia	**17.9**	**19.3**	**11.2**
Total Tronox	**74.4**	**78.1**	**66.1**

Item 3. Legal Proceedings

Information required by this item is incorporated herein by reference to the section captioned “Notes to Consolidated Financial Statements, Note 20 - Commitments and Contingencies” of this Form 10-K.

SEC Regulations require us to disclose certain information about administrative or judicial proceedings to which a governmental authority is party arising under federal, state or local environmental provisions if we reasonably believe that such proceedings may result in monetary sanctions above a stated threshold. Pursuant to the SEC regulations, the Company uses a threshold of $1 million or more for purposes of determining whether disclosure of any such proceedings is required.

Item 4. Mine Safety Disclosures

None.

PART II

Item 5. Market for Registrant's Common Equity, Related Shareholder Matters and Issuer Purchases of Equity Securities

Market for our Ordinary Shares

Our ordinary shares trade on the New York Stock Exchange under the symbol "TROX."

Holders of Record

As of January 31, 2021, there were approximately 58 holders of record of ordinary shares. This does not include the shareholders that held shares of our ordinary shares in a nominee or "street-name" accounts through banks or broker-dealers. See Item 12, Security Ownership of Certain Beneficial Owners and Management and Related Shareholder Matters.

Item 6. Selected Financial Data

Not applicable.

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion should be read in conjunction with Tronox Holdings plc's consolidated financial statements and the related notes included elsewhere in this Annual Report on Form 10-K. This discussion and other sections in this Annual Report on Form 10-K contain forward-looking statements, within the meaning of the Private Securities Litigation Reform Act of 1995, that involve risks and uncertainties, and actual results could differ materially from those discussed in the forward-looking statements as a result of numerous factors. Forward-looking statements provide current expectations of future events based on certain assumptions and include any statement that does not directly relate to any historical or current fact. Forward-looking statements also can be identified by words such as "future," "anticipates," "believes," "estimates," "expects," "intends," "plans," "predicts," "will," "would," "could," "can," "may," and similar terms. There are important factors that could cause our actual results, level of activity, performance or achievements to differ materially from the results, level of activity, performance or achievements expressed or implied by the forward-looking statements. In particular, you should consider the numerous risks and uncertainties outlined in Item 1A. "Risk Factors."

This Management's Discussion and Analysis of Financial Condition and Results of Operations contains certain financial measures, in particular the presentation of earnings before interest, taxes, depreciation and amortization ("EBITDA") and Adjusted EBITDA, which are not presented in accordance with accounting principles generally accepted in the United States ("U.S. GAAP"). We are presenting these non-U.S. GAAP financial measures because we believe they provide us and readers of this Form 10-K with additional insight into our operational performance relative to earlier periods and relative to our competitors. We do not intend for these non-U.S. GAAP financial measures to be a substitute for any U.S. GAAP financial information. Readers of these statements should use these non-U.S. GAAP financial measures only in conjunction with the comparable U.S. GAAP financial measures. A reconciliation of net income (loss) to EBITDA and Adjusted EBITDA is also provided herein.

Executive Overview

Tronox Holdings plc (referred to herein as "Tronox", "we", "us", or "our") operates titanium-bearing mineral sand mines and beneficiation operations in Australia, South Africa and Brazil to produce feedstock materials that can be processed into TiO_2 for pigment, high purity titanium chemicals, including titanium tetrachloride, and Ultrafine© titanium dioxide used in certain specialty applications. It is our long-term strategic goal to be vertically integrated and consume all of our feedstock materials in our own nine TiO_2 pigment facilities which we operate in the United States, Australia, Brazil, UK, France, the Netherlands, China and the Kingdom of Saudi Arabia ("KSA"). We believe that vertical integration is the best way to achieve our ultimate goal of delivering low cost, high-quality pigment to our coatings and other TiO_2 customers throughout the world. The mining, beneficiation and smelting of titanium bearing mineral sands creates meaningful quantities of zircon, which we also supply to customers around the world.

We are a public limited company formed under the laws of England and Wales. Tronox was formerly listed on the New York Stock Exchange as Tronox Limited, a company formed under the laws of Western Australia. However, in March 2019, we re-domiciled to the United Kingdom, and as a result of the re-domiciling, Tronox Limited became a wholly-owned subsidiary of Tronox Holdings plc. Another significant corporate milestone occurred on April 10, 2019 when we completed the acquisition from National Industrialization Company ("Tasnee") of the TiO_2 business of The National Titanium Dioxide Company Limited ("Cristal") (the "Cristal Transaction"). The Cristal Transaction doubled our size and expanded the number of TiO_2 pigment facilities we operate from three to nine and gave us control of several new mines, particularly in Australia. In order to obtain regulatory approval for the Cristal Transaction, we were required to divest Cristal's North American TiO_2 business, which was sold in May 2019. See Note 3 for further details on the Cristal Transaction.

Business Environment

The following discussion includes trends and factors that may affect future operating results:

Throughout the current COVID-19 pandemic, our operations have been designated as essential to support the continued manufacturing of products such as food and medical packaging, medical equipment, pharmaceuticals, and personal protective gear.

The COVID-19 pandemic has impacted our industry and business and the Company has taken, and will continue to take, measures, to minimize the impact to our operations and maintain liquidity. In response to the initial pandemic, some of these measures have included delaying capital expenditures, delaying merit increases, increased working capital management cost reductions and incremental borrowings to maintain incremental liquidity. We will continue to monitor the pandemic, related impact to our business and will take additional precautions as deemed necessary.

During the second and third quarters of 2020, the Company experienced a significant reduction in TiO_2 and Zircon sales volumes which was in line with expectations as a result of the decline in global GDP. Sales in the fourth quarter of 2020 increased 13% compared to the prior year period. Sequentially, revenues increased 16% in the fourth quarter compared to the third quarter of 2020 driven by a continued demand recovery as well as delivery on our synergy targets from the Cristal Transaction. In the fourth quarter of 2020, TiO_2 sales volumes increased in the Asia, Europe, Middle East and Africa regions with slight decrease in North America. Average TiO_2 selling prices were stable in the North American market and were slightly up in the Asia, Europe, Middle East, Africa and South and Central American regions. Based upon current conditions we believe our TiO_2 business will continue to benefit from an expected global industry recovery in 2021.

Gross profit increased sequentially from the third quarter to the fourth quarter of 2020 due to the favorable impacts of TiO_2 and Zircon sales volumes as well as favorable impact of foreign currency on sales. Gross profit was also positively impacted by $10 million for synergies realized in relation to the Cristal Transaction however was more than offset by a negative impact of $17 million on foreign currency on costs of goods sold primarily due to the South African rand and Australian dollar. In addition, the fourth quarter included a $4 million reimbursement from claims related to the Ginkgo concentrator failure we inherited as part of the Cristal Transaction.

As of December 31, 2020, our total available liquidity was $1,041 million, including $619 million in cash and cash equivalents and $422 million available under revolving credit agreements including $285 million available under our Asset Backed Lending ("ABL") facility. Our total debt was $3.3 billion and net debt to trailing-twelve month Adjusted EBITDA was 4.1x.

Additionally, consistent with our previously stated capital allocation priorities, in December 2020, the Company made a voluntary prepayment of $200 million on its Term Loan Facility. The Company anticipates making a voluntary repayment of $300 million on the Term Loan Facility during the first quarter of 2021 from the cash on our Consolidated Balance Sheet originally intended for the TTI acquisition. There are no upcoming maturities on the Company's term loan or bonds until 2024. The Company also has no financial covenants on its term loan or bonds and only one springing financial covenant on its ABL facility which we do not expect to be triggered based on our current scenario planning.

Pro Forma Income Statement Information

The acquisition of the TiO_2 business of Cristal on April 10, 2019 impacts the comparability of the reported results for 2020 compared to 2019. Since Tronox and Cristal have combined their respective businesses effective with the merger date of April 10, 2019, the year ended December 31, 2020 reflects the results of the combined business, without any pro forma adjustments, while the year ended December 31, 2019 reflect the results of the combined business from April 10, 2019. To assist with a discussion of the 2020 and 2019 results on a comparable basis, certain supplemental unaudited pro forma income statement information is provided on a consolidated basis and is referred to as "pro forma information".

The pro forma information has been prepared on a basis consistent with Article 11 of Regulation S-X, assuming the merger and merger-related divestitures of Cristal’s North American TiO_2 business and the 8120 paper laminate grade had been consummated on January 1, 2018. In preparing this pro forma information, the historical financial information has been adjusted to give effect to pro forma adjustments that are (i) directly attributable to the business combination and other transactions presented herein, such as the merger-related divestitures, (ii) factually supportable, and (iii) expected to have a continuing impact on the combined entity’s consolidated results. The pro forma information is based on management’s assumptions and is presented for illustrative purposes and does not purport to represent what the results of operations would actually have been if the business combination and merger-related divestitures had occurred as of the dates indicated or what the results would be for any future periods. Also, the pro forma information does not include the impact of any revenue, cost or other operation synergies in the periods prior to the acquisition that may result from the business combination or any related restructuring costs.

Consolidated Results of Operations from Continuing Operations

Year Ended December 31, 2020 Compared to the Year Ended December 31, 2019

	Reported Amounts			Pro Forma Amounts [1]		
	Year Ended December 31,			Year Ended December 31,		
	2020	2019	Variance	2020	2019	Variance
	(Millions of U.S. Dollars)			(Millions of U.S. Dollars)		
Net sales	$ 2,758	$ 2,642	$ 116	$ 2,758	$ 3,008	$ (250)
Cost of goods sold	2,137	2,159	(22)	2,137	2,364	(227)
Contract loss	—	19	(19)	—	—	—
Gross profit	$ 621	$ 464	$ 157	621	644	(23)
Gross Margin	*23 %*	*18 %*	*5 pts*	*23 %*	*21 %*	*2 pts*
Selling, general and administrative expenses	347	347	—	347	354	(7)
Restructuring	3	22	(19)	3	22	(19)
Income from operations	271	95	176	271	268	3
Interest expense	(189)	(201)	12	(189)	(207)	18
Interest income	8	18	(10)	8	12	(4)
Loss on extinguishment of debt	(2)	(3)	1	(2)	(3)	1
Other income (expense), net	26	3	23	26	2	24
Income (loss) from continuing operations before income taxes	114	(88)	202	114	72	42
Income tax provision	881	(14)	895	881	(31)	912
Net income (loss) from continuing operations	$ 995	$ (102)	$1,097	$ 995	$ 41	$ 954
Effective tax rate	*(773)%*	*(16)%*	*(757) pts*	*(773)%*	*(43)%*	*(730) pts*
EBITDA[2]	$ 599	$ 375	$ 224	$ 599	$ 590	$ 9
Adjusted EBITDA[2]	$ 668	$ 615	$ 53	$ 668	$ 681	$ (13)
Adjusted EBITDA as % of Net Sales	*24 %*	*23 %*	*1 pt*	*24 %*	*23 %*	*1 pt*

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(1) The pro forma amounts have been prepared on a basis consistent with Article 11 of Regulation S-X. See "Supplemental Pro Forma Information" section of this MD&A for further detail.

(2) EBITDA and Adjusted EBITDA are Non-U.S. GAAP financials measures. Please refer to the “Non-U.S. GAAP Financial Measures” section of this Management’s Discussion and Analysis of Financial Condition and Results of Operations for a discussion of these measures and a reconciliation of these measures to Net income (loss) from continuing operations.

Reported net sales of $2,758 million for the year ended December 31, 2020 increased by 4% compared to $2,642 million for the same period in 2019. The year ended December 31, 2020 includes approximately $352 million of revenue from Cristal operations for the first quarter of 2020 and the first nine days of April 2020 for which there were no comparable amounts in the prior year period given the acquisition closed on April 10, 2019. Excluding this Cristal revenue, revenue decreased 9% primarily due to lower TiO_2 sales volumes as a result of the COVID-19 pandemic as well as lower Zircon average selling prices. On a pro forma basis, net sales for the year ended December 31, 2020 decreased $250 million in comparison to the same period in 2019 primarily due to the decreases in sales volumes of TiO2 and pig iron as well as lower average selling prices of Zircon. Net sales by type of product for the years ended December 31, 2020 and 2019 were as follows:

The table below presents reported revenue by product:

(Millions of dollars, except percentages)	Year Ended December 31, 2020	Year Ended December 31, 2019	Variance	Percentage
TiO_2	$ 2,176	$ 2,049	$ 127	6 %
Zircon	283	290	(7)	(2) %
Feedstock and other products	299	303	(4)	(1) %
Total net sales	$ 2,758	$ 2,642	$ 116	4 %

The table below presents pro forma revenue by product:

(Millions of dollars, except percentages)	Year Ended December 31, 2020	Year Ended December 31, 2019	Variance	Percentage
TiO_2	$ 2,176	$ 2,374	$ (198)	(8) %
Zircon	283	310	(27)	(9) %
Feedstock and other products	299	324	(25)	(8) %
Total net sales	$ 2,758	$ 3,008	$ (250)	(8) %

On a reported basis, for the year ended December 31, 2020, TiO_2 revenue increased $127 million, or 6%, compared to the prior year. Given the acquisition of Cristal on April 10, 2019, there is approximately $306 million of revenue in the first quarter of 2020 and first nine days of April 2020 for which there were no comparable amounts in the same period of the prior year. Excluding this revenue generated from the Cristal operations, TiO_2 revenue decreased by $179 million due to a $152 million decrease in sales volumes as a result of the COVID-19 pandemic and a decrease of $42 million in average selling prices. Foreign currency positively impacted TiO_2 revenue by $15 million due primarily to the strengthening of the Euro. Zircon revenues for the Cristal operation in the first quarter of 2020 and first nine days of April 2020 were approximately $17 million. Excluding this Cristal related revenue, Zircon revenue decreased $24 million primarily due to a $34 million reduction in average selling prices partially offset by an $11 million increase in sales volumes. Feedstock and other products revenues for the Cristal operations in the first quarter of 2020 and first nine days of April 2020 were approximately $29 million. Excluding this Cristal related revenue, feedstock and other products revenue decreased $32 million primarily due to lower sales volumes of CP slag, ilmenite, and rutile prime.

On a pro forma basis, for the year ended December 31, 2020, TiO_2 revenue was lower by $198 million or 8% compared to the prior year driven by a 7% or $160 million decrease in sales volumes, a 2% decrease in average selling prices impacting revenue by $47 million and a $1 million decrease in product mix. Foreign currency increased TiO_2 revenue by $10 million due to the strengthening of the Euro. Zircon revenue declined $27 million, or 9%, due to a 13% decrease in average selling prices partially offset by a 4% increase in sales volumes. Feedstock and other product revenue was lower by $25 million, or 8%, compared to the prior year due to decreases in ilmenite sales and decreases in CP slag sales volumes.

On a reported basis, our gross margin of $621 million for the year ended December 31, 2020 was 23% of net sales compared to 18% of net sales for the same period in 2019. The increase in gross margin is primarily due to:

- the favorable impact of 4 points due to the value of the inventory of Cristal being stepped up to fair value on the acquisition date in the prior year period, which resulted in the recognition of higher expense the prior year period;
- the favorable impact of 4 points due to the synergies realized from the Cristal Transaction;
- the net favorable impact of 3 points due to changes in foreign exchange rates, primarily due to the South African Rand, Euro and Brazilian Real;
- the favorable impact of 1 point due to the recognition of a $19 million charge for contract losses expected to be incurred on the 8120 supply agreement with Venator in the prior year period;
- the unfavorable impact of 3 points primarily due to a decrease in average selling prices of TiO_2 and Zircon;
- the unfavorable impact of 2 points due to inflationary cost pressures and unfavorable fixed overhead absorption, including idle facility charges and lower of cost or market charges, on lower volumes as we reduced production to match demand;

- the unfavorable impact of 1 point due to sales volumes and product mix; and
- the unfavorable impact of 1 point due to deferred margin recognized in the year-ago period which did not recur during the current period.

On a pro forma basis, our gross margin of $621 million for the year ended December 31, 2020 was 23% of net sales compared to 21% of net sales for the same period in 2019. The increase in gross margin is primarily due to:

- the favorable impact of 4 points due to the synergies realized from the Cristal Transaction;
- the net favorable impact of 3 points due to changes in foreign exchange rates, primarily due to the South African Rand, Euro and Brazilian Real;
- the favorable impact of 1 point due to sales volumes and product mix;
- the unfavorable impact of 3 points primarily due to a decrease in average selling prices of TiO_2 and Zircon;
- the unfavorable impact of 2 points due to inflationary cost pressures and unfavorable fixed overhead absorption, including idle facility charges and lower of cost or market charges, on lower volumes as we reduced production to match demand; and
- the unfavorable impact of 1 point due to deferred margin recognized in the year-ago period which did not recur during the current period.

On a reported basis, selling, general and administrative ("SG&A") expenses remained consistent for the year ended December 31, 2020 compared to the prior year. Given the acquisition of Cristal on April 10, 2019, there are approximately $23 million of expenses in the first quarter of 2020 and the first nine days of April 2020 for which there were no comparable amounts in the same period of the prior year. Excluding the effect of Cristal, SG&A expenses decreased $23 million primarily driven by $13 million of lower professional fees, a decrease of $12 million in travel and entertainment expenses as a result of the COVID-19 pandemic, a $6 million decrease in research and development expenses, lower integration costs of $5 million and lower agent commissions of $3 million partially offset by $12 million increase in employee costs primarily driven by higher incentive compensation, higher costs of $2 million for IT and communication expenses, and higher costs of $3 million related to the transitional service agreement associated with the Cristal acquisition. On a pro forma basis, selling, general and administrative expenses decreased primarily due to $21 million of synergies, lower travel and entertainment expenses of $13 million partially offset by transaction costs of $14 million included in 2020 related to the TTI acquisition of which all transaction costs in 2019 related to the Cristal Transaction were excluded for proforma purposes, $9 million increase in incentive compensation and $6 million due to merit increases.

On both a reported and pro forma basis, we recorded restructuring expenses of $3 million for employee-related costs associated with headcount reductions during the year ended December 31, 2020. See Note 4 of notes to consolidated financial statements.

On a reported basis, income from operations for the year ended December 31, 2020 of $271 million, increased by $176 million or 185% compared to the same period in 2019 which is primarily attributable to the higher gross margin and lower restructuring charges.

On a pro forma basis, income from operations for the year ended December 31, 2020 was $271 million, an increase of $3 million compared to $268 million in the prior year due to lower SG&A expenses and lower restructuring costs partially offset by the lower gross margin in the current year.

On both a reported basis and a proforma basis, Adjusted EBITDA as a percentage of net sales was 24% for the year ended December 31, 2020, an increase of 1 point from 23% in the prior year. On a reported basis, the higher gross profit, as a result of the reflection of synergies related to the Cristal Transaction, were the primary drivers of the year-over-year increase in Adjusted EBITDA percentage. On a proforma basis, the lower SG&A expenses as a result of the reflection of synergies related to the Cristal Transaction, offset by the lower gross profit was the primary driver of the increase in Adjusted EBITDA percentage.

On a reported basis and a pro forma basis, interest expense for the year ended December 31, 2020 decreased by $12 million and $18 million, respectively, compared to the same period in 2019 primarily due to lower average debt outstanding balances and lower average interest rates mainly on the Term Loan Facility and Standard Bank Term Loan Facility.

On a reported and pro forma basis, interest income for the year ended December 31, 2020 decreased by $10 million and $4 million, respectively, compared to the prior year primarily due to lower cash balances from the use of cash and previously restricted cash in the second quarter of 2019 for the acquisition of the Cristal Transaction as well as the overall decrease in interest rates on our cash investments period over period.

Loss on extinguishment of debt of $2 million for the year ended December 31, 2020 resulted from the voluntary prepayment of $200 million on our Term Loan Facility in December 2020.

On a reported basis and pro forma basis, other income (expense), net for the year ended December 31, 2020 primarily consisted of $4 million net realized and unrealized foreign currency gains, an approximate $2 million adjustment associated with a curtailment gain due to the freezing of plan benefits partially offset by pension settlements, and a $11 million reimbursement from claims related to the Ginkgo concentrator failure we inherited as part of the Cristal Transaction, and $5 million associated with the monthly technical service fee relating to the Jazan slagger we receive from AMIC. Refer to Note 24 for further information. On a reported basis, other income (expense), net for the year ended December 31, 2019 primarily consisted of $5 million net realized and unrealized foreign currency gains and a $2 million adjustment associated with a settlement gain related to the Cristal U.S. pension plan.

We maintain full valuation allowances related to the total net deferred tax assets in Australia and the United Kingdom. For entities acquired in the Cristal Transaction, we have full valuation allowances in Australia, Saudi Arabia, and Switzerland. The provisions for income taxes associated with these jurisdictions include no tax benefits with respect to losses incurred and tax expense only to the extent of current tax payments. Additionally, we have valuation allowances against other specific tax assets.

On a reported basis, the effective tax rate was (773)% and (16)% for the years ended December 31, 2020 and 2019, respectively. The large negative effective tax rate for the year ended December 31, 2020 is caused by the release of valuation allowances for deferred tax assets in the U.S. and Brazil, partially offset by the recording of valuation allowances in Saudi Arabia and the U.K. The net impact was $905 million benefit to the income tax provision. Refer to Note 8 for further information. Additionally, the effective tax rates for the years ended December 31, 2020 and 2019 are influenced by a variety of factors, primarily income and losses in jurisdictions with valuation allowances, disallowable expenditures, restructuring impacts, and our jurisdictional mix of income at tax rates different than the U.K. statutory rate.

Year Ended December 31, 2019 Compared to the Year Ended December 31, 2018

A discussion of our results of operations for the year ended December 31, 2019 versus December 31, 2018 is included in Part II, Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations - Results of Operation”, included in our Annual Report on Form 10-K for the year ended December 31, 2019.

Other Comprehensive Income (Loss)

There was an other comprehensive loss of $20 million for the year ended December 31, 2020 compared to other comprehensive income of $11 million for the year ended December 31, 2019 representing a reduction of $31 million year over year. This reduction was primarily driven by negative movements year-over year foreign currency translation adjustments of $23 million coupled with an increase of $7 million of comprehensive losses associated with pension and post retirement plans. Unrecognized losses on derivative instruments of $12 million year over year was largely offset by $11 million of recognized gains on derivatives during the same period.

A discussion of our comprehensive (loss) income for the year ended December 31, 2019 versus December 31, 2018 is included in Part II, Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations - Other Comprehensive (Loss) Income”, included in our Annual Report on Form 10-K for the year ended December 31, 2019.

Liquidity and Capital Resources

During 2020, our liquidity increased by $393 million to $1,041 million.

The table below presents our liquidity, including amounts available under our credit facilities, as of the following dates:

	December 31, 2020	December 31, 2019
Cash and cash equivalents	$ 619	$ 302
Available under the Wells Fargo Revolver	285	209
Available under the Standard Credit Facility	68	72
Available under the Emirates Revolver	50	46
Available under the SABB Facility	19	19
Total	$ 1,041	$ 648

Historically, we have funded our operations and met our commitments through cash generated by operations, issuance of unsecured notes, bank financings and borrowings under lines of credit. In the next twelve months, we expect that our operations and available borrowings under our debt refinancing and revolving credit agreements (see Note 15 of notes to consolidated financial statements) will provide sufficient cash for our operating expenses, capital expenditures, interest payments and debt repayments. This is predicated on our achieving our forecast which could be negatively impacted by items outside of our control, in particular, macroeconomic conditions including the economic impacts caused by continued impact of the COVID-19 pandemic. Consistent with our actions in 2020 in response to the COVID-19 pandemic, if negative events occur in the future, we may need to reduce our capital spend, cut back on operating costs, and other items within our control to maintain appropriate liquidity.

Working capital (calculated as current assets less current liabilities) was $1.7 billion at December 31, 2020, compared to $1.4 billion at December 31, 2019.

As of and for the year ended December 31, 2020, the non-guarantor subsidiaries of our Senior Notes due 2025 represented approximately 17% of our total consolidated liabilities, approximately 27% of our total consolidated assets, approximately 42% of our total consolidated net sales and approximately 45% of our Consolidated EBITDA (as such term is defined in the 2025 Indenture). In addition, as of December 31, 2020, our non-guarantor subsidiaries had $791 million of total consolidated liabilities (including trade payables but excluding intercompany liabilities), all of which would have been structurally senior to the 2025 Notes. See Note 15 of notes to consolidated financial statements for additional information.

At December 31, 2020, we had outstanding letters of credit and bank guarantees of $71 million. See Note 15 of notes to consolidated financial statements.

Principal factors that could affect our ability to obtain cash from external sources include (i) debt covenants that limit our total borrowing capacity; (ii) increasing interest rates applicable to our floating rate debt; (iii) increasing demands from third parties for financial assurance or credit enhancement; (iv) credit rating downgrades, which could limit our access to additional debt; (v) a decrease in the market price of our common stock and debt obligations; and (vi) volatility in public debt and equity markets.

As of December 31, 2020, our credit rating with Moody’s and Standard & Poor’s changed from December 31, 2019 from B1 positive to B1 stable outlook and from B stable to B negative outlook, respectively.

Cash and Cash Equivalents

We consider all investments with original maturities of three months or less to be cash equivalents. As of December 31, 2020, our cash and cash equivalents were invested in money market funds and we also receive earnings credits for some balances left in our bank operating accounts. We maintain cash and cash equivalents in bank deposit and money market accounts that may exceed federally insured limits. The financial institutions where our cash and cash equivalents are held are highly rated and geographically dispersed, and we have a policy to limit the amount of credit exposure with any one institution. We have not experienced any losses in such accounts and believe we are not exposed to significant credit risk.

The use of our cash includes payment of our operating expenses, capital expenditures, servicing our interest and debt repayment obligations, making pension contributions and making quarterly dividend payments.

Repatriation of Cash

At December 31, 2020, we held $619 million in cash and cash equivalents in these respective jurisdictions: $298 million in the United States, $49 million in South Africa, $80 million in Australia, $75 million in Brazil, $33 million in Saudi Arabia, $33 million in China, $50 million in Europe and $1 million in India. Our credit facilities limit transfers of funds from subsidiaries in the United States to certain foreign subsidiaries. In addition, at December 31, 2020, we held $29 million of restricted cash of which $18 million is in Europe and is related to the termination fee associated with the TTI acquisition, $10 million is in Australia related to performance bonds and $1 million is in Saudi Arabia related to vendor supply agreement guarantees.

Tronox Holdings plc has foreign subsidiaries with undistributed earnings at December 31, 2020. We have made no provision for deferred taxes related to these undistributed earnings because they are considered indefinitely reinvested in the foreign jurisdictions.

Debt Obligations

In March 2020, under an abundance of caution given the uncertainty associated with the COVID-19 pandemic, the Company took precautionary measures and drew down $200 million in the aggregate of its outstanding borrowings under its Wells Fargo, Standard Bank, and Emirates revolvers in order to increase liquidity and preserve financial flexibility. As discussed below, the Company repaid the outstanding balances of these short-term credit facilities with a portion of the proceeds of the $500 million 6.5% senior secured notes due 2025. Additionally, during the twelve months ended December 31, 2020, our KSA subsidiary drew down $13 million on its SABB Credit Facility for local working capital purposes. During the fourth quarter of 2020, the Company repaid the full $13 million on the SABB Credit Facility. At December 31, 2020, there were no short term debt balances with the exception of the $58 million included in "Long term debt due within one year" on the Consolidated Balance Sheet.

In December 2020, the Company made a voluntary prepayment of $200 million on the Term Loan Facility. No prepayment penalties were required as result of this principal prepayment. As a result of the prepayment, we recorded approximately $2 million in "Loss on extinguishment of debt" in our Consolidated Statement of Operations.

At December 31, 2020 and 2019, our long-term debt, net of unamortized discount and debt issuance costs was $3.3 billion and $3.0 billion, respectively.

At both December 31, 2020 and 2019, our net debt (the excess of our debt over cash and cash equivalents) was $2.7 billion. See Note 15 of notes to consolidated financial statements.

In January 2021, the Company announced the termination of the TTI Acquisition. As a result of the termination, the Company paid to the seller, Eramet, an $18 million termination fee in January 2021. The $18 million was recorded within "Restricted Cash" on our Consolidated Balance Sheet as of December 31, 2020. Additionally, consistent with our previously stated capital allocation priorities, the Company anticipates making a voluntary repayment of $300 million on the Term Loan Facility during the first quarter of 2021 from the cash on our Consolidated Balance Sheet originally intended for the TTI acquisition.

On February 22, 2021, we announced the launch of a possible refinancing of (a) our First Lien Term Loan Credit Agreement, dated as of September 22, 2017, with a new term loan facility, and (b) our Revolving Syndicated Facility Agreement, dated as of September 22, 2017, with a new cash flow revolving facility.

Cash Flows

Years Ended December 31, 2020 and 2019

The following table presents cash flow from continuing operations for the periods indicated:

	Year Ended December 31,	
	2020	2019
	(Millions of U.S. dollars)	
Net cash provided by operating activities	$ 355	$ 412
Net cash used in investing activities	(229)	(1,185)
Net cash provided by (used in) financing activities	214	(638)
Net cash provided by discontinued operations	—	28
Effect of exchange rate changes on cash	(3)	(2)
Net increase (decrease) in cash and cash equivalents	$ 337	$ (1,385)

Cash Flows provided by Operating Activities — Cash provided by our operating activities is driven by net income from continuing operations adjusted for non-cash items and changes in working capital items. The following table summarizes our net cash provided by (used in) operating activities for 2020 and 2019:

	Year Ended December 31,	
	2020	2019
	(Millions of U.S. dollars)	
Net income (loss) from continuing operations	$ 995	$ (102)
Net adjustments to reconcile net income (loss) to net cash provided by operating activities	(488)	456
Income related cash generation	507	354
Net change in assets and liabilities	(152)	58
Net cash provided by our operating activities	$ 355	$ 412

Net cash provided by operating activities was $355 million in 2020 as compared to net cash provided by operating activities of $412 million in 2019. The decrease of $57 million period over period is primarily due to an increase of $210 million use of cash for net assets and liabilities which more than offset a $153 million improvement in net income from continuing operations - net of non-cash adjustments. The higher use of cash for working capital was primarily driven by increases in accounts receivable, inventories and prepaid and other current assets of $49 million, $21 million and $29 million, respectively. These increases were coupled with an increased use of cash in long-term other assets and liabilities of $68 million.

Cash Flows used in Investing Activities — Net cash used in investing activities for the year ended December 31, 2020 was $229 million as compared to $1,185 million for the year ended December 31, 2019. The $956 million decrease in use of cash year over year is primarily driven by the cash paid of approximately $1,675 million for the acquisition of Cristal partially offset by the proceeds of $701 million received from the sale of the Cristal North America business in the prior period. Capital expenditures of $195 million during the current year were slightly lower than prior year capital expenditure levels of $198 million, which is attributable to a decrease in capital spending during the current year in an effort to preserve liquidity due to the COVID-19 pandemic partially offset by prior year capital expenditures not including Cristal for the first three months and first nine days of April of 2019 as the Cristal Transaction closed on April 10, 2020. In addition, the current year also includes $36 million for a loan to AMIC related to a titanium slag smelter facility (see Note 24 of notes to the consolidated financial statements) as compared to $25 million in the prior period.

Cash Flows (used in) provided by Financing Activities — Net cash provided by financing activities during the year ended December 31, 2020 was $214 million as compared to cash used in financing activities of $638 million for the year ended December 31, 2019. The current year is primarily comprised of $500 million proceeds from the issuances of the 6.5% Senior Secured Notes due 2025 (see Note 15 to the notes to the consolidated financial statements). Partially offsetting these proceeds was a use of cash of $233 million for the repayment of long-term debt, primarily on the Term Loan Facility, $40 million for dividend payments and $10 million for debt issuance costs. The cash used in financing activities during the year ended December 31, 2019 was primarily driven by repayments of long term debt of $387 million versus proceeds of only $222 million from debt, repurchases of common stock of $288 million, the Company's redemption of Exxaro's 26% ownership interest in one of Tronox's South African subsidiary (see Note 24 of notes to consolidated financial statements) for $148 million and $27 million of dividends paid.

Years Ended December 31, 2019 and 2018

A discussion of our cash flows for the year ended December 31, 2019 versus December 31, 2018 is included in Part II, Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations - Cash Flows”, included in our Annual Report on Form 10-K for the year ended December 31, 2019.

Contractual Obligations

The following table sets forth information relating to our contractual obligations as of December 31, 2020:

		Contractual Obligation Payments Due by Period(3)			
	Total	Less than 1 year	1-3 years	3-5 years	More than 5 years
		(Millions of U.S. dollars)			
Long-term debt and lease financing (including interest)(1)	$ 4,123	$ 226	$ 441	$ 2,812	$ 644
Purchase obligations(2)	575	194	146	100	135
Operating leases	204	44	43	24	93
Pension and other post-retirement benefit obligations (4)	326	39	67	65	155
Asset retirement obligations (5)	436	2	35	31	368
Total	**$ 5,664**	**$ 505**	**$ 732**	**$ 3,032**	**$ 1,395**

(1) We calculated the Term Loan interest at a LIBOR plus a margin of 3.0%. See Note 15 of notes to our consolidated financial statements.

(2) Includes obligations to purchase requirements of process chemicals, supplies, utilities and services. We have various purchase commitments for materials, supplies, and services entered into in the ordinary course of business. Included in the purchase commitments table above are contracts, which require minimum volume purchases that extend beyond one year or are renewable annually and have been renewed for 2020. Certain contracts allow for changes in minimum required purchase volumes in the event of a temporary or permanent shutdown of a facility. We believe that all of our purchase obligations will be utilized in our normal operations.

(3) The table excludes contingent obligations, as well as any possible payments for uncertain tax positions given the inability to estimate the possible amounts and timing of any such payments.

(4) Pension and other post-retirement benefit ("OPEB") obligations of $326 million include estimates of pension plan contributions and expected future benefit payments for unfunded pension and OPEB plans. Pension plan contributions are forecasted for 2021 only. Expected future unfunded pension and OPEB benefit payments are forecasted only through 2030. Contribution and unfunded benefit payment estimates are based upon current valuation assumptions. Estimates of pension contributions after 2021 and unfunded benefit payments after 2030 are not included in the table because the timing of their resolution cannot be estimated. Refer to Note 23 in notes to consolidated financial statements for further discussion on our pension and OPEB plans.

(5) Asset retirement obligations are shown at the undiscounted and uninflated values.

Non-U.S. GAAP Financial Measures

EBITDA and Adjusted EBITDA, which are used by management to measure performance, are not presented in accordance with U.S. GAAP. We define EBITDA as net income (loss) excluding the impact of income taxes, interest expense, interest income and depreciation, depletion and amortization. We define Adjusted EBITDA as EBITDA excluding the impact of nonrecurring items such as restructuring charges, gain or loss on debt extinguishments, impairment charges, gains or losses on sale of assets, acquisition-related transaction costs and pension settlements and curtailment gains or losses. Adjusted EBITDA also excludes non-cash items such as share-based compensation costs and pension and postretirement costs. Additionally, we exclude from Adjusted EBITDA, realized and unrealized foreign currency remeasurement gains and losses.

Management believes that EBITDA and Adjusted EBITDA is useful to investors, as it is commonly used in the industry as a means of evaluating operating performance. We do not intend for these non-U.S. GAAP financial measures to be a substitute for any U.S. GAAP financial information. Readers of these statements should use these non-U.S. GAAP financial measures only in conjunction with the comparable U.S. GAAP financial measures. Since other companies may calculate EBITDA and Adjusted EBITDA differently than we do, EBITDA and Adjusted EBITDA, as presented herein, may not be comparable to similarly titled measures reported by other companies. Management believes these non-U.S. GAAP financial measures:

- reflect our ongoing business in a manner that allows for meaningful period-to-period comparison and analysis of trends in our business, as they exclude income and expense that are not reflective of ongoing operating results;
- provide useful information in understanding and evaluating our operating results and comparing financial results across periods; and
- provide a normalized view of our operating performance by excluding items that are either noncash or infrequently occurring.

Adjusted EBITDA is one of the primary measures management uses for planning and budgeting processes, and to monitor and evaluate financial and operating results. In addition, Adjusted EBITDA is a factor in evaluating management’s performance when determining incentive compensation.

The following table reconciles net income (loss) to EBITDA and Adjusted EBITDA for the periods presented:

	Year Ended December 31, 2020	2019	2018
Net (loss) income, (U.S. GAAP)	$ 995	$ (97)	$ 30
Income (loss) from discontinued operations, net of tax (see Note 6), (U.S. GAAP)	—	5	—
Net (loss) income from continuing operations, (U.S. GAAP)	995	(102)	30
Interest expense	189	201	193
Interest income	(8)	(18)	(33)
Income tax provision	(881)	14	13
Depreciation, depletion and amortization expense	304	280	195
EBITDA (non-U.S. GAAP)	599	375	398
Inventory step-up[(a)]	—	98	—
Impairment loss[(b)]	—	—	31
Contract loss[(c)]	—	19	—
Share-based compensation[(d)]	30	32	21
Transaction costs[(e)]	14	32	66
Restructuring[(f)]	3	22	—
Integration costs[(g)]	10	16	—
Loss on extinguishment of debt [(h)]	2	3	30
Foreign currency remeasurement[(i)]	(4)	(6)	(28)
Pension settlement and curtailment gains [(j)]	(2)	(1)	(3)
Charge for capital gains tax payment to Exxaro [(k)]	—	4	—
Reversal of accrual related to tax settlement [(l)]	—	—	(11)
Insurance proceeds[(m)]	(11)	—	—
Other items[(n)]	27	21	9
Adjusted EBITDA (non-U.S. GAAP)	$ 668	$ 615	$ 513

(a) Represents a pre-tax charge related to the recognition of a step-up in value of inventories as a result of purchase accounting.

(b) Represents a pre-tax charge for the impairment and loss on sale of the assets of our Tronox Electrolytic Operations which was recorded in "Impairment loss" in the Consolidated Statements of Operations. See Note 6 of notes to consolidated financial statements.

(c) Represents a pre-tax charge for the estimated losses we expect to incur under the supply agreement with Venator. See Note 3 of notes to consolidated financial statements.

(d) Represents non-cash share-based compensation. See Note 22 of notes to consolidated financial statements.

(e) 2020 amount represents transaction costs associated with the TTI acquisition which were recorded in "Selling, general and administrative expenses" in the Consolidated Statement of Operations. 2019 and 2018 amounts represent transaction costs associated with the Cristal Transaction which were recorded in “Selling, general and administrative expenses” in the Consolidated Statements of Operations.

(f) Represents amounts for employee-related costs, including severance, which was recorded in “Restructuring” in the Consolidated Statements of Operations. See Note 4 of notes to consolidated financial statements.

(g) Represents integration costs associated with the Cristal Transaction after the acquisition which were recorded in "Selling, general and administrative expenses" in the Consolidated Statements of Operations.

(h) 2020 amount represents the loss in connection with a voluntary prepayment on the Term Loan Facility. See Note 15 of notes to consolidated financial statements. 2019 amount represents the loss in connection with the modification of the Wells Fargo Revolver and termination of the ABSA Revolver and a voluntary prepayment made on the Term Loan Facility. 2018 amount represents the $30 million loss in connection with the redemption of senior notes, including a call premium of $22 million.

(i) Represents realized and unrealized gains and losses associated with foreign currency remeasurement related to third-party and intercompany receivables and liabilities denominated in a currency other than the functional currency of the entity holding them, which are included in "Other income (expense), net" in the Consolidated Statements of Operations. Prior to the first quarter of 2019, realized gains and losses associated with third-party receivables and liabilities had been included in Adjusted EBITDA. Commencing with 2019, we are now excluding these amounts from Adjusted EBITDA and prior period amounts have been revised for comparability purposes. The exclusion of all of the realized and unrealized gains and losses is consistent with the reporting of Adjusted EBITDA we make to our lenders.

(j) 2020 amount represents a curtailment gain due to the freezing of plan benefits partially offset by pension settlements. 2019 amount represents settlement gain related to the U.S. Pension Plan (acquired as part of the Cristal Transaction). 2018 amount represents settlement gain related to the former U.S. postretirement medical plan.

(k) Represents the payment to Exxaro for capital gains tax on the disposal of its ordinary shares in Tronox Holdings plc included in "Other income (expense), net" in the Consolidated Statements of Operations.

(l) Represents the reversal of an accrual as a result of a tax settlement.

(m) 2020 amount represents reimbursement from claims related to the Ginkgo concentrator failure we inherited as a part of the Cristal Transaction.

(n) Includes noncash pension and postretirement costs, accretion expense, severance expense, and other items included in “Selling general and administrative expenses” and “Cost of goods sold” in the Consolidated Statements of Operations.

The following table reconciles net income from continuing operations to Adjusted EBITDA on a pro forma basis for the periods presented (see footnotes under the as reported Adjusted EBITDA table for discussion of adjustments to derive Adjusted EBITDA):

	Year Ended December 31,	
	2020	2019
Net income from continuing operations (U.S. GAAP)	$ 995	$ 41
Interest expense	189	207
Interest income	(8)	(12)
Income tax provision	(881)	31
Depreciation, depletion and amortization expense	304	323
EBITDA (non-U.S. GAAP)	599	590
Share-based compensation	30	32
Transaction costs	14	—
Restructuring	3	22
Integration Costs	10	16
Loss on extinguishment of debt	2	3
Foreign currency remeasurement	(4)	(6)
Pension settlement and curtailment gains	(2)	(1)
Charge for capital gains tax payment to Exxaro	—	4
Insurance proceeds	(11)	—
Other items	27	21
Adjusted EBITDA (non-U.S. GAAP)	$ 668	$ 681

Critical Accounting Policies and Estimates

The preparation of financial statements in conformity with U.S. GAAP requires management to make certain estimates and assumptions regarding matters that are inherently uncertain and that ultimately affect the reported amounts of assets, liabilities, revenues and expenses, and the disclosure of contingent assets and liabilities. The estimates and assumptions are based on management’s experience and understanding of current facts and circumstances. These estimates may differ from actual results. Certain of our accounting policies are considered critical, as they are both important to reflect our financial position and results of operations and require significant or complex judgment on the part of management. The following is a summary of certain accounting policies considered critical by management.

Asset Retirement Obligations

To the extent a legal obligation exists, an asset retirement obligation (“ARO”) is recorded at its estimated fair value and accretion expense is recognized over time as the discounted liability is accreted to its expected settlement value. Because AROs represent financial obligations to be settled in the future, uncertainties exist in estimating the timing and amount of the associated costs to be incurred. Fair value is measured using expected future cash outflows, adjusted for expected inflation and discounted at our credit-adjusted risk-free interest rate. No market-risk premium has been included in our calculation of ARO balances since we can make no reliable estimate. Management believes these estimates and assumptions are reasonable; however, they are inherently uncertain. Refer to Notes 19 to the consolidated financial statements for a summary of the estimates and assumptions utilized. At December 31, 2020, AROs were $166 million of which the long-term portion of $157 million is recorded in "Asset retirement obligations" and the short-term portion of $9 million is recorded in "Accrued liabilities" in the Consolidated Balance Sheet.

Environmental Matters

Liabilities for environmental matters are recognized when remedial efforts are probable and the costs can be reasonably estimated. Such liabilities are based on our best estimate of the undiscounted future costs required to complete the remedial work. The recorded liabilities are adjusted periodically as remediation efforts progress or as additional technical, regulatory or legal information becomes available. Given the uncertainties regarding the status of laws, regulations, enforcement policies, the impact of other potentially responsible parties, technology and information related to individual sites, we do not believe it is possible to develop an estimate of the range or reasonably possible environmental loss in excess of our recorded liabilities. At December 31, 2020, environmental liabilities were $67 million, primarily related to the Cristal Transaction (see Note 3 to the consolidated financial statements).

For further discussion, see Environmental Matters included elsewhere in this section entitled, "Management's Discussion and Analysis of Financial Condition and Results of Operations" and Notes 2 and 20 to the consolidated financial statements.

Income Taxes

We have operations in several countries around the world and are subject to income and similar taxes in these countries. The estimation of the amounts of income tax involves the interpretation of complex tax laws and regulations and how foreign taxes affect domestic taxes, as well as the analysis of the realizability of deferred tax assets, tax audit findings and uncertain tax positions. Although we believe our tax accruals are adequate, differences may occur in the future, depending on the resolution of pending and new tax matters.

Deferred tax assets and liabilities are determined based on temporary differences between the financial reporting and tax bases of assets and liabilities using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. A valuation allowance is provided against a deferred tax asset when it is more likely than not that all or some portion of the deferred tax asset will not be realized. We periodically assess the likelihood that we will be able to recover our deferred tax assets, and reflect any changes in our estimates in the valuation allowance with a corresponding adjustment to earnings or other comprehensive income (loss) as appropriate. ASC 740, *Income Taxes*, requires that all available positive and negative evidence be weighted to determine whether a valuation allowance should be recorded.

The amount of income taxes we pay are subject to ongoing audits by federal, state and foreign tax authorities, which may result in proposed assessments. Our estimate for the potential outcome for any uncertain tax issue is highly judgmental. We assess our income tax positions, and record tax benefits for all years subject to examination based upon our evaluation of the facts, circumstances and information available at the reporting date. For those tax positions for which it is more likely than not that a tax benefit will be sustained, we record the amount that has a greater than 50% likelihood of being realized upon settlement with a taxing authority that has full knowledge of all relevant information. Interest and penalties are accrued as part of tax expense, where applicable. If we do not believe that it is more likely than not that a tax benefit will be sustained, no tax benefit is recognized.

See Notes 2 and 8 to the consolidated financial statements for additional information.

Contingencies

From time to time, we may be subject to lawsuits, investigations and disputes (some of which involve substantial amounts claimed) arising out of the conduct of our business, including matters relating to commercial transactions, prior acquisitions and divestitures including our acquisition of Cristal, employee benefit plans, intellectual property, and environmental, health and safety matters. We recognize a liability for any contingency that is probable of occurrence and reasonably estimable. We continually assess the likelihood of adverse judgments of outcomes in these matters, as well as potential ranges of possible losses (taking into consideration any insurance recoveries), based on a careful analysis of each matter with the assistance of outside legal counsel and, if applicable, other experts. Such contingencies are significant and the accounting requires considerable management judgments in analyzing each matter to assess the likely outcome and the need for establishing appropriate liabilities and providing adequate disclosures.

Refer to Notes 2 and 20 to the consolidated financial statements for additional information.

Long-Lived Assets

Key estimates related to long-lived assets (property, plant and equipment, mineral leaseholds, and intangible assets) include useful lives, recoverability of carrying values, and the existence of any asset retirement obligations. As a result of future decisions, such estimates could be significantly modified. The estimated useful lives of property, plant and equipment range from three to forty years, and depreciation is recognized on a straight-line basis. Useful lives are estimated based upon our historical experience, engineering estimates, and industry information. These estimates include an assumption regarding periodic maintenance. Mineral leaseholds are depreciated over their useful lives as determined under the units of production method. Intangible assets with finite useful lives are amortized on the straight-line basis over their estimated useful lives. The amortization methods and remaining useful lives are reviewed quarterly.

We evaluate the recoverability of the carrying value of long-lived assets that are held and used whenever events or changes in circumstances indicate that the carrying value may not be recoverable. Under such circumstances, we assess whether the projected undiscounted cash flows of our long-lived assets are sufficient to recover the carrying amount of the asset group being assessed. If the undiscounted projected cash flows are not sufficient, we calculate the impairment amount by discounting the projected cash flows using our weighted-average cost of capital. For assets that satisfy the criteria to be classified as held for sale, an impairment loss, if any, is recognized to the extent the carrying amount exceeds fair value, less cost to sell. The amount of the impairment of long-lived assets is written off against earnings in the period in which the impairment is determined.

Pension and Postretirement Benefits

We provide pension benefits for qualifying employees in the United States and internationally, with the largest in the United Kingdom. Because pension benefits represent financial obligations that will ultimately be settled in the future with employees who meet eligibility requirements, uncertainties exist in estimating the timing and amount of future payments, and significant estimates are required to calculate pension expense and liabilities relating to these plans. The company utilizes the services of independent actuaries, whose models are used to help facilitate these calculations. Several key assumptions are used in actuarial models to calculate pension expense and liability amounts recorded in the financial statements; the most significant variables in the models are the expected rate of return on plan assets, the discount rate, and the expected rate of compensation increase. Management believes the assumptions used in the actuarial calculations are reasonable, reflect the company's experience and expectations for the future and are within accepted practices in each of the respective geographic locations in which it operates. However, actual results in any given year often differ from actuarial assumptions due to economic events and different rates of retirement, mortality, and turnover. Refer to Notes 2 and 23 to the consolidated financial statements for a summary of the plan assumptions and additional information on our pension arrangements.

Expected Return on Plan Assets — In forming the assumption of the long-term rate of return on plan assets, we consider the expected earnings on funds already invested, earnings on contributions expected to be made in the current year, and earnings on reinvested returns. The long-term rate of return estimation methodology for the plans is based on a capital asset pricing model using historical data and a forecasted earnings model. An expected return on plan assets analysis is performed which incorporates the current portfolio allocation, historical asset-class returns, and an assessment of expected future performance using asset-class risk factors. A 100 basis point change in these expected long-term rates of return, with all other variables held constant, would change our pension expense by approximately $5 million.

Discount Rate — The discount rates selected for estimation of the actuarial present value of the benefit obligations are determined based on the prevailing market rate for high-quality, fixed-income debt instruments with maturities corresponding to the expected timing of benefit payments as of the annual measurement date for each of the various plans. These rates change from year to year based on market conditions that affect corporate bond yields. A 100 basis points change in discount rates, with all other variables held constant, would decrease/increase our pension expense by approximately $2 million. A 100 basis points reduction in discount rates would increase the PBO by approximately $80 million whereas a 100 basis point increase in discount rates would have a favorable impact to the PBO of approximately $68 million.

Rates of Compensation Increase - We determine these rates based on review of the underlying long-term salary increase trend characteristic of the local labor markets and historical experience, as well as comparison to peer companies. A 100 basis points change in the expected rate of compensation increase, with all other variables held constant, would change our pension expense by approximately $1 million and would impact the PBO by approximately $6 million.

Recent Accounting Pronouncements

See Note 2 of notes to Consolidated Financial Statements for recently issued accounting pronouncements.

Environmental Matters

We are subject to a broad array of international, federal, state, and local laws and regulations relating to safety, pollution, protection of the environment, and the generation, storage, handling, transportation, treatment, disposal, and remediation of hazardous substances and waste materials. In the ordinary course of business, we are subject to frequent environmental inspections and monitoring, and occasional investigations by governmental enforcement authorities. Under these laws, we are or may be required to obtain or maintain permits or licenses in connection with our operations. In addition, under these laws, we are or may be required to remove or mitigate the effects on the environment of the disposal or release of chemical, petroleum, low-level radioactive and other substances at our facilities. We may incur future costs for capital improvements and general compliance under environmental, health, and safety laws, including costs to acquire, maintain, and repair pollution control equipment. Environmental laws and regulations are becoming increasingly stringent, and compliance costs are significant and will continue to be significant in the foreseeable future. There can be no assurance that such laws and regulations or any environmental law or regulation enacted in the future is not likely to have a material effect on our business. We believe we are in compliance with applicable environmental rules and regulations in all material respects.

Refer to Item 3. Legal Proceedings for further information.

Supplemental Pro Forma Information

To assist in the discussion of the 2020 and 2019 results on a comparable basis, certain supplemental unaudited pro forma income statement and adjusted EBITDA information is provided on a consolidated basis. The pro forma information has been prepared on a basis consistent with Article 11 of Regulation S-X, assuming the merger and merger-related divestitures of Cristal's North American TiO_2 business and the 8120 paper laminate grade had been consummated on January 1, 2018. The unaudited pro forma financial information reflects certain adjustments related to the acquisition, such as:

(1) conforming the accounting policies of Cristal to those applied by Tronox;
(2) conversion to U.S. GAAP from IFRS for Cristal;
(3) the elimination of transactions between Tronox and Cristal;
(4) recording certain incremental expenses resulting from purchase accounting adjustments, such as inventory step-up amortization, depreciation, depletion and amortization expense in connection with fair value adjustments to property, plant and equipment, mineral leases and intangibles assets;
(5) recording the contract loss on the sale of the 8120 product line as a charge in the first quarter of 2018;
(6) recording the effect on interest expense related to borrowings in connection with the Cristal Transaction; and
(7) recording the related tax effects and impacts to EPS for the shares issued in conjunction with the transaction.

In preparing this pro forma information, the historical financial information has been adjusted to give effect to pro forma adjustments that are (i) directly attributable to the business combination and other transactions presented herein, such as the merger-related divestitures, (ii) factually supportable, and (iii) expected to have a continuing impact on the combined entity's consolidated results. The pro forma information is based on management's assumptions and is presented for illustrative purposes and does not purport to represent what the results of operations would actually have been if the business combination and merger-related divestitures had occurred as of the dates indicated or what the results would be for any future periods. Also, the pro forma information does not include the impact of any revenue, cost or other operating synergies that may result from the business combination or any related restructuring costs.

Events that are not expected to have a continuing impact on the combined results (nonrecurring income/charges) are excluded from the unaudited pro forma information.

The unaudited pro forma statement of operations and adjusted EBITDA have been presented for information purposes only and is not necessarily indicative of what Tronox's results actually would have been had the merger been completed on January 1, 2018. In addition, the unaudited pro forma information does not purport to project the future operating results of the Company.

The following unaudited pro forma information includes:

- Pro forma statement of operations for the year ended December 31, 2019
- Pro forma Adjusted EBITDA for the year ended December 31, 2019

Proforma Information for the year ended December 31, 2020:

For the year ended December 31, 2020, the pro forma statement of operations and pro forma Adjusted EBITDA information were the same as the as reported statement of operations and as reported Adjusted EBITDA information.

TRONOX HOLDINGS PLC
Pro Forma Statement of Operations Information
For the Year Ended December 31, 2019
(Unaudited)
(Millions of U.S. dollars, except share and per share data)

		Pro Forma Adjustments				
	Tronox Holdings plc	Cristal (a)	Other		Total	Pro Forma
Net sales	**$ 2,642**	**$ 379**	**$ (13)**	**(b)**	**$ 366**	**$ 3,008**
Cost of goods sold	2,159	294	(89)	(c)	205	2,364
Contract loss	19	—	(19)	(d)	(19)	—
Gross profit	**464**	**85**	**95**		**180**	**644**
Selling, general and administrative expenses	347	59	(52)	(e)	7	354
Restructuring	22	—	—		—	22
Income from operations	**95**	**26**	**147**		**173**	**268**
Interest expense	(201)	(5)	(1)	(f)	(6)	(207)
Interest income	18	—	(6)	(g)	(6)	12
Loss on extinguishment of debt	(3)	—	—		—	(3)
Other income (expense), net	3	(1)	—		(1)	2
(Loss) income from continuing operations before income taxes	**(88)**	**20**	**140**		**160**	**72**
Income tax provision	(14)	(4)	(13)		(17)	(31)
(Loss) income from continuing operations	**(102)**	**16**	**127**		**143**	**41**
Net income attributable to noncontrolling interest	12	1	10	(h)	11	23
Net (loss) income from continuing operations attributable to Tronox Holdings plc	**$ (114)**	**$ 15**	**$ 117**		**$ 132**	**$ 18**
Net (loss) income from continuing operations per share, basic	**$ (0.81)**					**$ 0.12**
Net (loss) income from continuing operations per share, diluted	**$ (0.81)**					**$ 0.12**
Weighted average shares outstanding, basic (in thousands)	**139,859**				(i)	**150,051**
Weighted average shares outstanding, diluted (in thousands)	**139,859**				(i)	**151,153**

Pro Forma Adjustments

(a) Includes results from continuing operations for Cristal for the period of January 1, 2019 through April 9, 2019. The Cristal Transaction closed on April 10, 2019.

(b) The adjustment to net sales includes $11 million to eliminate sales between Tronox and Cristal and $2 million to eliminate revenue associated with the divestiture of the 8120 paper laminate product grade.

(c) The adjustment to cost of goods sold includes (i) a credit of $11 million for the elimination of sales between Tronox and Cristal, (ii) a $1 million for the decrease in depreciation and depletion expense as a result of fair value adjustments to property, plant and equipment and mineral leases, and (iii) a credit of $98 million related to the amortizing of the step up in value of inventory. For pro forma purposes, the inventory step up was pushed back to 2018. Cost of goods sold also includes a reclassification of expenses of $21 million from SG&A to cost of goods sold for distribution costs as part of our accounting policy alignment.

(d) The adjustment is for the elimination of $19 million in non-recurring contract losses incurred on the 8120 supply agreement with Venator.

(e) The adjustment to SG&A includes the elimination of $33 million in non-recurring acquisition-related transaction costs incurred, the reclassification of $21 million in expenses from SG&A to cost of goods sold, and a $2 million increase in amortization expense as a result of the fair value adjustment to intangible assets.

(f) The adjustment to interest expense of $1 million reflects interest incurred on incremental borrowings under the Wells Fargo Revolver used to close the Cristal Transaction.

(g) The adjustment to interest income of $6 million reflects the elimination of interest earned on cash balances that were used to acquire Cristal.

(h) The adjustment to NCI of $10 million reflects the component of the inventory step-up which is attributable to our non-controlling interest.

(i) Represents an adjustment to reflect ordinary shares issued to Tasnee as part of the purchase price consideration.

TRONOX HOLDINGS PLC
Pro Forma Adjusted EBITDA Information
Year Ended December 31, 2019
(Millions of U.S. dollars)

	Tronox Holdings plc	Pro Forma Adjustments Cristal (a)	Other	Total	Pro Forma
Net (loss) income from continuing operations (U.S. GAAP)	$ (102)	$ 16	$ 127	$ 143	$ 41
Interest expense	201	5	1	6	207
Interest income	(18)	—	6	6	(12)
Income tax provision	14	4	13	17	31
Depreciation, depletion and amortization expense	280	42	1	43	323
EBITDA (non-U.S. GAAP)	375	67	148	215	590
Inventory step-up	98	—	(98)	(98)	—
Contract loss	19	—	(19)	(19)	—
Share-based compensation	32	—	—	—	32
Transaction costs	32	1	(33)	(32)	—
Restructuring	22	—	—	—	22
Integration Costs	16	—	—	—	16
Loss on extinguishment of debt	3	—	—	—	3
Foreign currency remeasurement	(6)	—	—	—	(6)
Pension settlement gain	(1)	—	—	—	(1)
Charge for capital gains tax payment to Exxaro	4	—	—	—	4
Other items	21	—	—	—	21
Adjusted EBITDA (non-U.S. GAAP)	$ 615	$ 68	$ (2)	$ 66	$ 681

(a) Includes results from continuing operations for Cristal for the period of January 1, 2019 through April 9, 2019. The acquisition closed on April 10, 2019.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

We are exposed to various market, credit, operational, and liquidity risks in the normal course of business, which are discussed below. We manage these risks through normal operating and financing activities and, when appropriate, with derivative instruments. We do not invest in derivative instruments for speculative purposes, but historically have entered into, and may enter into, derivative instruments for hedging purposes in order to reduce the exposure to fluctuations in interest rates, natural gas prices and exchange rates.

Market Risk

A substantial portion of our products and raw materials are commodities that reprice as market supply and demand fundamentals change. Accordingly, product margins and the level of our profitability tend to vary with changes in the business cycle. Our TiO_2 prices may do so in the near term as ore prices and pigment prices are expected to fluctuate over the next few years. We try to protect against such instability through various business strategies. These include provisions in sales contracts allowing us to pass on higher raw material costs through timely price increases and formula price contracts to transfer or share commodity price risk, as well as using varying contract term lengths and selling to a diverse mix of customers by geography and industry to reap the benefits of a diverse portfolio.

Credit Risk

Credit risk is the risk that a borrower or a counterparty will fail to meet their obligations. A significant portion of our liquidity is concentrated in trade accounts receivable that arise from sales of our products to customers. In the case of TiO_2, the high level of industry concentration has the potential to impact our overall exposure to credit risk, either positively or negatively, in that our customers may be similarly affected by changes in economic, industry or other conditions. We have significant exposure to credit risk in industries that are affected by cyclical economic fluctuations. We perform ongoing credit evaluations of our customers from time to time, as deemed appropriate, to mitigate credit risk but generally do not require collateral. Our contracts typically enable us to tighten credit terms if we perceive additional credit risk; however, historic losses due to write offs of bad debt have been relatively low. In addition, due to our international operations, we are subject to potential trade restrictions and sovereign risk in certain countries in which we operate. We maintain allowances for potential credit losses based on specific customer review and current financial conditions. During 2020, 2019 and 2018 our ten largest third-party customers represented 32%, 31%, and 37%, respectively, of our consolidated net sales. During 2020, 2019, and 2018, no single customer accounted for 10% of our consolidated net sales.

Interest Rate Risk

Interest rate risk arises from the possibility that changes in interest rates will impact our financial results. We are exposed to interest rate risk on our floating rate debt, the Term Loan Facility, Standard Bank Term Loan Facility, Tikon Loan and Wells Fargo, Standard Bank Revolver and Emirates Revolver balances. Using a sensitivity analysis as of December 31, 2020, a hypothetical 1% increase in interest rates would result in a net decrease to pre-tax income of approximately $7 million on an annualized basis. This is due to the fact that earnings on our interest earning financial assets of $306 million at December 31, 2020 would increase by the full 1%, offsetting the impact of a 1% increase in interest expense on our floating rate debt of $1.0 billion.

During 2019, we entered into interest-rate swap agreements for a portion of our Term Loan Facility, which effectively convert the variable rate to a fixed rate for a portion of the loan. The agreements expire in September 2024. The Company's objectives in using the interest-rate swap agreements are to add stability to interest expense and to manage its exposure to interest rate movements.

Currency Risk

Currency risk arises from the possibility that fluctuations in foreign exchange rates will impact our balance sheets due to the translation of our assets and liabilities denominated in foreign currencies, as well as our earnings due to the translation of certain of our subsidiaries’ statements of operations from local currencies to U.S. dollars, as well as due to remeasurement of assets and liabilities denominated in currencies other than a subsidiary’s functional currency. A significant portion of our Adjusted EBITDA is derived from jurisdictions that are subject to currency risk with Australia, Europe and South Africa representing the largest contributors. We manufacture and market our products in a number of countries throughout the world and, as a result, are exposed to changes in foreign currency exchange rates, particularly in Australia, Brazil, China, South Africa, the Netherlands and the United Kingdom. The exposure is more prevalent in South Africa and Australia as the majority of revenues are earned in U.S. dollars while expenses are primarily incurred in local currencies. Since we are exposed to movements in the South African rand and the Australian Dollar versus the U.S. dollar, we may enter into forward contracts to buy and sell foreign currencies as “economic hedges” for these foreign currency transactions.

During the third quarter of 2019 and the first quarter of 2020, we entered into foreign currency contracts used to hedge non-functional currency sales for our South African subsidiaries and forecasted non-functional currency cost of goods sold for our Australian subsidiaries. These foreign currency contracts are designated as cash flow hedges. Changes to the fair value of these foreign currency contracts are recorded as a component of other comprehensive income (loss) to the extent such contracts are effective, and are recognized in net sales or costs of goods sold in the period in which the forecasted transaction affects earnings or the transactions are no longer probable of occurring.

As of December 31, 2020, we had notional amounts of 330 million Australian dollars (approximately $254 million at December 31, 2020 exchange rate) that expire between January 29, 2021 and December 30, 2021 to reduce the exposure of our Australian subsidiaries’ cost of sales to fluctuations in currency rates. All of our existing foreign currency contracts that reduced the exposure of our South African subsidiaries' third party sales to fluctuations in currency rates had expired as of December 31, 2020. At December 31, 2020 and December 31, 2019, there was an unrealized net gain of $58 million and an unrealized net gain of $30 million, respectively, recorded in "Accumulated other comprehensive loss" on the Consolidated Balance Sheet.

From time to time, we enter into foreign currency contracts to reduce exposure of our subsidiaries’ balance sheet accounts not denominated in our subsidiaries’ functional currency to fluctuations in foreign currency exchange rates. At December 31, 2020, the fair value of the foreign currency contracts was a gain of $7 million.

Item 8. Financial Statements and Supplementary Data

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Shareholders of Tronox Holdings plc

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Tronox Holdings plc and its subsidiaries (the “Company”) as of December 31, 2020 and 2019, and the related consolidated statements of operations, of comprehensive income (loss), of changes in shareholders' equity and of cash flows for each of the three years in the period ended December 31, 2020, including the related notes (collectively referred to as the “consolidated financial statements”). We also have audited the Company's internal control over financial reporting as of December 31, 2020, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2020 and 2019, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2020 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2020, based on criteria established in Internal Control - Integrated Framework (2013) issued by the COSO.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management’s Report on Internal Control over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company’s consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting

A company’s internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company’s internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company’s assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Critical Audit Matters

The critical audit matter communicated below is a matter arising from the current period audit of the consolidated financial statements that was communicated or required to be communicated to the audit committee and that (i) relates to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Assessment of the Realizability of the U.S. Deferred Tax Assets

As described in Note 8 to the consolidated financial statements, the Company determined sufficient positive evidence existed to reverse a portion of the valuation allowance attributable to the deferred tax assets associated with its operations in the U.S. This reversal resulted in a non-cash deferred tax benefit of $909 million in 2020. Management's analysis to assess the realizability of the U.S. deferred tax assets considered positive and negative evidence, including (i) three years of cumulative income for its U.S. subsidiaries, (ii) continuing and improved profitability over the last twelve months in the U.S. jurisdiction, (iii) estimates of continued profitability based on updates to the Company's forecasts, (iv) changes in the factors that drove losses in the past, primarily interest expenses incurred in the U.S., and (v) risk that certain deferred tax assets may be subject to limitation under IRC Section 382.

The principal considerations for our determination that performing procedures relating to the assessment of the realizability of the U.S. deferred tax assets is a critical audit matter are the significant judgment by management in determining the amount and period when the valuation allowance is to be released, which in turn led to a high degree of auditor judgement, subjectivity and effort in performing procedures and evaluating audit evidence relating to management's assessment of the realizability of deferred tax assets, and management's significant assumptions relating to estimates of continued profitability and expected utilization of deferred tax assets considering the risk they may be subject to limitation under IRC Section 382.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the assessment of the realizability of the U.S. deferred tax assets, including controls over the determination of projected taxable income and expected utilization of deferred tax assets. These procedures also included, among others (i) testing the completeness and accuracy of underlying data used by management, (ii) evaluating management's assessment of the realizability of deferred tax assets in the U.S., and (iii) evaluating the reasonableness of management's significant assumptions related to estimates of continued profitability and expected utilization of deferred tax assets. Evaluating management's significant assumptions involved evaluating whether the assumptions were reasonable considering the current and past performance of the Company's U.S. subsidiaries and whether the assumptions were consistent with evidence obtained in other areas of the audit.

/s/ PricewaterhouseCoopers LLP
Stamford, Connecticut
February 23, 2021

We have served as the Company's auditor since 2014.

TRONOX HOLDINGS PLC
CONSOLIDATED STATEMENTS OF OPERATIONS
(Millions of U.S. dollars, except share and per share data)

	Year Ended December 31,		
	2020	2019	2018
Net sales	$ 2,758	$ 2,642	$ 1,819
Cost of goods sold	2,137	2,159	1,321
Contract loss	—	19	—
Gross profit	621	464	498
Selling, general and administrative expenses	347	347	267
Restructuring	3	22	—
Impairment loss	—	—	31
Income from operations	271	95	200
Interest expense	(189)	(201)	(193)
Interest income	8	18	33
Loss on extinguishment of debt	(2)	(3)	(30)
Other income (expense), net	26	3	33
Income (loss) from continuing operations before income taxes	114	(88)	43
Income tax benefit (provision)	881	(14)	(13)
Net income (loss) from continuing operations	995	(102)	30
Net income from discontinued operations, net of tax	—	5	—
Net income (loss)	995	(97)	30
Net income attributable to noncontrolling interest	26	12	37
Net income (loss) attributable to Tronox Holdings plc	$ 969	$ (109)	$ (7)
Net income (loss) per share, basic:			
Continuing operations	$ 6.76	$ (0.81)	$ (0.06)
Discontinued operations	$ —	$ 0.03	$ —
Net income (loss) per share, basic	$ 6.76	$ (0.78)	$ (0.06)
Net income (loss) per share, diluted:			
Continuing operations	$ 6.69	$ (0.81)	$ (0.06)
Discontinued operations	$ —	$ 0.03	$ —
Net income (loss) per share, diluted	$ 6.69	$ (0.78)	$ (0.06)
Weighted average shares outstanding, basic (in thousands)	143,355	139,859	122,881
Weighted average shares outstanding, diluted (in thousands)	144,906	139,859	122,881

See notes to consolidated financial statements.

TRONOX HOLDINGS PLC
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)
(Millions of U.S. dollars)

	Year Ended December 31,		
	2020	2019	2018
Net income (loss)	$ 995	$ (97)	$ 30
Other comprehensive income (loss):			
Foreign currency translation adjustments	(4)	19	(177)
Pension and postretirement plans (See Note 23):			
Actuarial losses, net of taxes of $ 5, $1 and less than $1 in 2020, 2019 and 2018, respectively	(20)	(11)	(5)
Amortization of unrecognized actuarial losses, net of taxes of less than $ 1 in 2020, 2019, and 2018	4	2	3
Settlement gain reclassified from accumulated other comprehensive loss to the Consolidated Statements of Operations (no tax impact)	—	—	(3)
Total pension and postretirement losses	(16)	(9)	(5)
Realized losses (gains) on derivative instruments reclassified from accumulated other comprehensive loss to the Consolidated Statements of Operations	4	(7)	—
Unrealized (losses) gains on derivative financial instruments, (net of taxes of $ 5, $5 in 2020 and 2019, respectively and no tax impact in 2018; See Note 16)	(4)	8	1
Other comprehensive (loss) income	(20)	11	(181)
Total comprehensive income (loss)	$ 975	$ (86)	$ (151)
Comprehensive income (loss) attributable to noncontrolling interest:			
Net income	26	12	37
Foreign currency translation adjustments	(16)	16	(44)
Comprehensive income (loss) attributable to noncontrolling interest	10	28	(7)
Comprehensive income (loss) attributable to Tronox Holdings plc	$ 965	$ (114)	$ (144)

See notes to consolidated financial statements.

TRONOX HOLDINGS PLC
CONSOLIDATED BALANCE SHEETS
(Millions of U.S. dollars, except share and per share data)

	December 31, 2020	December 31, 2019
ASSETS		
Current Assets		
Cash and cash equivalents	$ 619	$ 302
Restricted cash	29	9
Accounts receivable (net of allowance of $ 5 in 2020 and $5 in 2019)	540	482
Inventories, net	1,137	1,131
Prepaid and other assets	200	143
Income taxes receivable	4	6
Total current assets	2,529	2,073
Noncurrent Assets		
Property, plant and equipment, net	1,759	1,762
Mineral leaseholds, net	803	852
Intangible assets, net	201	208
Lease right of use assets, net	81	101
Deferred tax assets	1,020	110
Other long-term assets	175	162
Total assets	$ 6,568	$ 5,268
LIABILITIES AND EQUITY		
Current Liabilities		
Accounts payable	$ 356	$ 342
Accrued liabilities	350	283
Short-term lease liabilities	39	38
Long-term debt due within one year	58	38
Income taxes payable	2	1
Total current liabilities	805	702
Noncurrent Liabilities		
Long-term debt, net	3,263	2,988
Pension and postretirement healthcare benefits	146	160
Asset retirement obligations	157	142
Environmental liabilities	67	65
Long-term lease liabilities	41	62
Deferred tax liabilities	176	184
Other long-term liabilities	42	49
Total liabilities	4,697	4,352
Commitments and Contingencies - Note 20		
Shareholders' Equity		
Tronox Holdings plc ordinary shares, par value $0.01 — 143,557,479 shares issued and outstanding at December 31, 2020 and 141,900,459 shares issued and outstanding at December 31, 2019	1	1
Capital in excess of par value	1,873	1,846
Retained Earnings (accumulated deficit)	434	(493)
Accumulated other comprehensive loss	(610)	(606)
Total Tronox Holdings plc shareholders' equity	1,698	748
Noncontrolling interest	173	168
Total equity	1,871	916
Total liabilities and equity	$ 6,568	$ 5,268

See notes to consolidated financial statements.

TRONOX HOLDINGS PLC
CONSOLIDATED STATEMENTS OF CASH FLOWS
(Millions of U.S. dollars)

	Year Ended December 31,		
	2020	2019	2018
Cash Flows from Operating Activities:			
Net (loss) income	$ 995	$ (97)	$ 30
Net income (loss) from discontinued operations, net of tax	—	5	—
Net (loss) income from continuing operations	995	(102)	30
Adjustments to reconcile net (loss) income from continuing operations to net cash provided by operating activities, continuing operations:			
Depreciation, depletion and amortization	304	280	195
Deferred income taxes	(899)	(9)	(21)
Share-based compensation expense	30	32	21
Amortization of deferred debt issuance costs and discount on debt	10	8	11
Loss on extinguishment of debt	2	3	30
Contract loss	—	19	—
Impairment loss	—	—	31
Acquired inventory step-up recognized in earnings	—	98	—
Other non-cash affecting net income (loss)	65	25	(9)
Changes in assets and liabilities:			
(Increase) decrease in accounts receivable, net	(49)	78	(11)
(Increase) decrease in inventories, net	(21)	(59)	(47)
(Increase) decrease in prepaid and other assets	(29)	20	4
Increase (decrease) in accounts payable and accrued liabilities	17	67	(51)
Net changes in income tax payables and receivables	(2)	(13)	10
Changes in other non-current assets and liabilities	(68)	(35)	(23)
Cash provided by operating activities – continuing operations	355	412	170
Cash Flows from Investing Activities:			
Capital expenditures	(195)	(198)	(117)
Cristal Acquisition	—	(1,675)	—
Proceeds from sale of Ashtabula	—	701	—
Insurance proceeds	1	10	—
Proceeds from sale of businesses	—	—	6
Loans	(36)	(25)	(64)
Proceeds from the sale of assets	1	2	1
Cash used in investing activities – continuing operations	(229)	(1,185)	(174)
Cash Flows from Financing Activities:			
Repayments of short-term debt	(13)	—	—
Repayments of long-term debt	(233)	(387)	(606)
Proceeds from short-term debt	13	—	—
Proceeds from long-term debt	500	222	615
Repurchase of common stock	—	(288)	—
Acquisition of noncontrolling interest	—	(148)	—
Debt issuance costs	(10)	(4)	(10)
Call premium paid	—	—	(22)
Dividends paid	(40)	(27)	(23)
Restricted stock and performance-based shares settled in cash for taxes	(3)	(6)	(6)
Proceeds from the exercise of warrants and options	—	—	6
Cash provided by (used in) financing activities – continuing operations	214	(638)	(46)
Discontinued Operations:			
Cash provided by operating activities	—	29	—
Cash used in investing activities	—	(1)	—
Net cash flows provided by discontinued operations	—	28	—
Effects of exchange rate changes on cash and cash equivalents and restricted cash	(3)	(2)	(23)
Net increase (decrease) in cash and cash equivalents and restricted cash	337	(1,385)	(73)
Cash and cash equivalents and restricted cash at beginning of period	311	1,696	1,769

Cash and cash equivalents and restricted cash at end of period - continuing operations	$ 648	$ 311	$ 1,696
Supplemental cash flow information - continuing operations:			
Interest paid, net	$ 159	$ 188	$ 184
Income taxes paid	$ 17	$ 34	$ 28

See notes to consolidated financial statements.

TRONOX HOLDINGS PC
CONSOLIDATED STATEMENTS OF CHANGES IN SHAREHOLDERS' EQUITY
(Millions of U.S. dollars)

	Tronox Holdings plc Ordinary Shares (in thousands)	Tronox Holdings plc Ordinary Shares (amount)	Capital in Excess of par Value	(Accumulated Deficit) Retained Earnings	Accumulated Other Comprehensive Loss	Total Tronox Limited Shareholders' Equity	Non-controlling Interest	Total Equity
Balance at January 1, 2018	121,271	$ 1	$ 1,558	$ (327)	$ (403)	$ 829	$ 186	$ 1,015
Net (loss) income	—	—	—	(7)	—	(7)	37	30
Other comprehensive income	—	—	—	—	(137)	(137)	(44)	(181)
Shares-based compensation	1,426	—	21	—	—	21	—	21
Shares cancelled	(316)	—	(6)	—	—	(6)	—	(6)
Ordinary share dividends ($0.045 per share)	—	—	—	(23)	—	(23)	—	(23)
Warrants and options exercised	553	—	6	—	—	6	—	6
Balance at December 31, 2018	122,934	$ 1	$ 1,579	$ (357)	$ (540)	$ 683	$ 179	$ 862
Net (loss) income	—	—	—	(109)	—	(109)	12	(97)
Other comprehensive income	—	—	—	—	(5)	(5)	16	11
Shares-based compensation	3,347	—	32	—	—	32	—	32
Shares issued for acquisition	37,580	—	526	—	—	526	—	526
Shares repurchased and cancelled	(21,453)	—	(288)	—	—	(288)	—	(288)
Shares cancelled	(508)	—	(6)	—	—	(6)	—	(6)
Acquisition of noncontrolling interest	—	—	3	—	(61)	(58)	(90)	(148)
Cristal acquisition	—	—	—	—	—	—	51	51
Ordinary share dividends ($0.045 per share)	—	—	—	(27)	—	(27)	—	(27)
Balance at December 31, 2019	141,900	$ 1	$ 1,846	$ (493)	$ (606)	$ 748	$ 168	$ 916
Net (loss) income	—	—	—	969	—	969	26	995
Other comprehensive loss	—	—	—	—	(4)	(4)	(16)	(20)
Shares-based compensation	2,032	—	30	—	—	30	—	30
Shares cancelled	(375)	—	(3)	—	—	(3)	—	(3)

Measurement period adjustment related to Cristal acquisition	—	—	—	—	—	—	(3)	(3)
Minority interest dividend	—	—	—	—	—	—	(2)	(2)
Ordinary share dividends ($0.07 per share)	—	—	—	(42)	—	(42)	—	(42)
Balance at December 31, 2020	143,557	$ 1	$ 1,873	$ 434	$ (610)	$ 1,698	$ 173	$ 1,871

See notes to consolidated financial statements.

TRONOX HOLDINGS PLC
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(Millions of U.S. dollars, except share, per share and metric tons data or unless otherwise noted)

1. The Company

Tronox Holdings plc (referred to herein as "Tronox", the "Company", "we", "us", or "our") operates titanium-bearing mineral sand mines and smelter operations in Australia, South Africa and Brazil to produce feedstock materials that can be processed into TiO_2 for pigment, high purity titanium chemicals, including titanium tetrachloride, and Ultrafine© titanium dioxide used in certain specialty applications. It is our long-term strategic goal to be vertically integrated and consume all of our feedstock materials in our own nine TiO_2 pigment facilities which we operate in the United States, Australia, Brazil, UK, France, the Netherlands, China and the Kingdom of Saudi Arabia (“KSA”). We believe that vertical integration is the best way to achieve our ultimate goal of delivering low cost, high-quality pigment to our coatings and other TiO_2 customers throughout the world. The mining, beneficiation and smelting of titanium bearing mineral sands creates meaningful quantities of zircon, which we also supply to customers around the world.

We are a public limited company formed under the laws of England and Wales. Tronox was formerly listed on the New York Stock Exchange as Tronox Limited, a company formed under the laws of Western Australia. However, in March 2019, we re-domiciled to the United Kingdom, and as a result of the re-domiciling, Tronox Limited became a wholly-owned subsidiary of Tronox Holdings plc. Another significant corporate milestone occurred on April 10, 2019 when we completed the acquisition from National Industrialization Company ("Tasnee") of the TiO_2 business of The National Titanium Dioxide Company Limited (“Cristal”) (the “Cristal Transaction”). The Cristal Transaction doubled our size and expanded the number of TiO_2 pigment facilities we operate from three to nine and gave us control of several new mines, particularly in Australia. In order to obtain regulatory approval for the Cristal Transaction, we were required to divest Cristal's North American TiO_2 business, which was sold in May 2019. See Note 3 for further details on the Cristal Transaction.

Basis of Presentation

We are considered a domestic company in the United Kingdom and, as such, are required to comply with filing requirements in the United Kingdom. Additionally, we are not considered a “foreign private issuer” in the U.S.; therefore, we are required to comply with the reporting and other requirements imposed by the U.S. securities law on U.S. domestic issuers, which, among other things, requires reporting under accounting principles generally accepted in the United States of America (“U.S. GAAP”). The consolidated financial statements included in this Form 10-K are prepared in conformity with U.S. GAAP.

Our consolidated financial statements include the accounts of all majority-owned subsidiary companies. All intercompany balances and transactions have been eliminated in consolidation. Certain prior period amounts have been reclassified to conform to the manner and presentation in the current period.

Use of Estimates

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting periods. It is at least reasonably possible that the effect on the financial statements of a change in estimate due to one or more future confirming events could have a material effect on the financial statements.

2. Significant Accounting Policies

Foreign Currency

The U.S. dollar is our reporting currency for our consolidated financial statements in U.S. GAAP. We determine the functional currency of each subsidiary based on a number of factors, including the predominant currency for revenues, expenditures and borrowings. Adjustments from the remeasurement of non-functional currency monetary assets and liabilities are recorded in “Other income (expense), net” in the Consolidated Statements of Operations. When a subsidiary’s functional currency is not the U.S. dollar, translation adjustments resulting from translating the functional currency financial statements into U.S. dollar equivalents are recorded in “Accumulated other comprehensive loss” in the Consolidated Balance Sheets.

Translation adjustments on intercompany foreign currency receivables and payables that are not expected to be settled in the foreseeable future are reported in the same manner as translation adjustments.

Revenue Recognition

We recognize revenue at a point in time when the customer obtains control of the promised products. For most transactions this occurs when products are shipped from our manufacturing facilities or at a later point when control of the products transfers to the customer at a specified destination or time. All amounts billed to a customer in a sales transaction related to shipping and handling represent revenues earned and are reported as “Net sales” in the Consolidated Statements of Operations. Accruals are made for sales returns, rebates and other allowances, which are recorded in “Net sales” in the Consolidated Statements of Operations and are based on our historical experience and current business conditions. Additionally, we have elected the practical expedient to exclude sales taxes and similar taxes that we collect from customers on behalf of government authorities from the revenue transaction price. See Note 5.

Cost of Goods Sold

Cost of goods sold includes costs for purchasing, receiving, manufacturing, and distributing products, including raw materials, energy, labor, depreciation, depletion, shipping and handling, freight, warehousing, and other production costs.

Research and Development

Research and development costs, included in “Selling, general and administrative expenses” in the Consolidated Statements of Operations comprised of salaries, building costs, utilities, administrative expenses, third party research, and allocations of corporate costs, were $12 million, $17 million, and $11 million during 2020, 2019, and 2018, respectively, and were expensed as incurred.

Selling, General and Administrative Expenses

Selling, general and administrative expenses include costs related to marketing, research and development, agent commissions, and legal and administrative functions such as corporate management, human resources, information technology, investor relations, accounting, treasury, and tax compliance.

Income Taxes

We use the asset and liability method of accounting for income taxes. The estimation of the amounts of income taxes involves the interpretation of complex tax laws and regulations and how foreign taxes affect domestic taxes, as well as the analysis of the realizability of deferred tax assets, tax audit findings, and uncertain tax positions.

Deferred tax assets and liabilities are determined based on temporary differences between the financial reporting and tax bases of assets and liabilities using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. A valuation allowance is provided against a deferred tax asset when it is more likely than not that all or some portion of the deferred tax asset will not be realized. We periodically assess the likelihood that we will be able to recover our deferred tax assets, and reflect any changes in our estimates in the valuation allowance, with a corresponding adjustment to earnings or other comprehensive income (loss), as appropriate. All available positive and negative evidence is weighted to determine whether a valuation allowance should be recorded.

The amount of income taxes we pay is subject to ongoing audits by federal, state, and foreign tax authorities, which may result in proposed assessments. Our estimate for the potential outcome for any uncertain tax issue is highly judgmental. We assess our income tax positions, and record tax benefits for all years subject to examination based upon our evaluation of the facts, circumstances, and information available at the reporting date. For those tax positions for which it is more likely than not that a tax benefit will be sustained, we record the amount that has a greater than 50% likelihood of being realized upon settlement with a taxing authority that has full knowledge of all relevant information. Interest and penalties are accrued as part of tax expense, where applicable. If we do not believe that it is more likely than not that a tax benefit will be sustained, no tax benefit is recognized. See Note 8.

Earnings per Share

Basic and diluted earnings per share are calculated using the two-class method. Under the two-class method, earnings used to determine basic earnings per share are reduced by an amount allocated to participating securities. Participating securities include restricted shares issued under the Tronox Management Equity Incentive Plan (the “MEIP”) (see Note 22), which contains non-forfeitable dividend rights. Our unexercised options and unvested restricted share units do not contain non-forfeitable rights to dividends and, as such, are not considered in the calculation of basic earnings per share. Our unvested restricted shares do not have a contractual obligation to share in losses; therefore, when we record a net loss, none of the loss is allocated to participating securities. Consequently, in periods of net loss, the two-class method does not have an effect on basic loss per share.

Diluted earnings per share is calculated by dividing net earnings allocable to ordinary shares by the weighted-average number of ordinary shares outstanding for the period, as adjusted for the potential dilutive effect of non-participating restricted share units, options, and prior to February 2018 Series A and Series B Warrants. The options and Series A and Series B Warrants are included in the calculation of diluted earnings per ordinary share utilizing the treasury stock method. See Note 9.

Fair Value Measurement

We measure fair value on a recurring basis utilizing valuation techniques that maximize the use of observable inputs and minimize the use of unobservable inputs, to the extent possible, and consider counterparty credit risk in our assessment of fair value. The fair value hierarchy is as follows:

- Level 1 – Quoted prices in active markets for identical assets and liabilities;
- Level 2 – Quoted prices for similar assets and liabilities in active markets, quoted prices for identical or similar assets and liabilities in markets that are not active or other inputs that are observable or can be corroborated by observable market data; and,
- Level 3 – Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets and liabilities

See Note 17.

Cash and Cash Equivalents

We consider all investments with original maturities of three months or less to be cash equivalents. We maintain cash and cash equivalents in bank deposit and money market accounts that may exceed federally insured limits. The financial institutions where our cash and cash equivalents are held are generally highly rated and geographically dispersed, and we have a policy to limit the amount of credit exposure with any one institution. We have not experienced any losses in such accounts and believe we are not exposed to significant credit risk.

At December 31, 2020, we had restricted cash of $29 million comprised of $18 million in Europe related to the termination fee associated with the TTI acquisition, $10 million in Australia related to outstanding performance bonds and $1 million in Saudi Arabia related to vendor supply agreement guarantees. At December 31, 2019, included in restricted cash was $9 million primarily in Australia related to outstanding performance bonds.

Accounts Receivable, net of allowance for credit losses

We perform credit evaluations of our customers, and take actions deemed appropriate to mitigate credit risk. Only in certain specific occasions do we require collateral in the form of bank or parent company guarantees or guarantee payments. We maintain allowances for potential credit losses based on specific customer review and current financial conditions.

Inventories, net

Pigment inventories are stated at the lower of actual cost and net realizable value, net of allowances for obsolete and slow-moving inventory. The cost of inventories is determined using the first-in, first-out method. Carrying values include material costs, labor, and associated indirect manufacturing expenses. Costs for materials and supplies, excluding titanium ore, are determined by average cost to acquire. Feedstock and co-products inventories including titanium ore are stated at the lower of the weighted-average cost of production or market. Inventory costs include those costs directly attributable to products, including all manufacturing overhead but excluding distribution costs. Raw materials are carried at actual cost.

We review the cost of our inventory in comparison to its net realizable value. We also periodically review our inventory for obsolescence. In either case, we record any write-down equal to the difference between the cost of inventory and its estimated net realizable value based on assumptions about alternative uses, market conditions and other factors. Inventories expected to be sold or consumed within twelve months after the balance sheet date are classified as current assets and all other inventories are classified as non-current assets. See Note 10.

Long Lived Assets

Property, plant and equipment, net is stated at cost less accumulated depreciation, and is depreciated over its estimated useful life using the straight-line method as follows:

Land improvements	10 — 20 years
Buildings	10 — 40 years
Machinery and equipment	3 — 25 years
Furniture and fixtures	10 years

Maintenance and repairs are expensed as incurred, except for costs of replacements or renewals that improve or extend the lives of existing properties, which are capitalized. Upon retirement or sale, the cost and related accumulated depreciation are removed from the respective account, and any resulting gain or loss is included in “Cost of goods sold” or “Selling, general, and administrative expenses” in the Consolidated Statements of Operations. See Note 11.

We capitalize interest costs on major projects that require an extended period of time to complete. See Note 15.

Mineral property acquisition costs are capitalized as tangible assets when management determines that probable future benefits consisting of a contribution to future cash inflows have been identified and adequate financial resources are available or are expected to be available as required to meet the terms of property acquisition and anticipated exploration and development expenditures. Mineral leaseholds are depleted over their useful lives as determined under the units of production method. Mineral property exploration costs are expensed as incurred. When it has been determined that a mineral property can be economically developed as a result of establishing proven and probable reserves, the costs incurred to develop such property through the commencement of production are capitalized. See Note 12.

Intangible assets are stated at cost less accumulated amortization and are amortized on a straight-line basis over their estimated useful lives, which generally range from 3 to 20 years. See Note 13.

We evaluate the recoverability of the carrying value of long-lived assets that are held and used whenever events or changes in circumstances indicate that the carrying value may not be recoverable. Under such circumstances, we assess whether the projected undiscounted cash flows of our long-lived assets are sufficient to recover the carrying amount of the asset group being assessed. If the undiscounted projected cash flows are not sufficient, we calculate the impairment amount by discounting the projected cash flows using our weighted-average cost of capital. For assets that satisfy the criteria to be classified as held for sale, an impairment loss, if any, is recognized to the extent the carrying amount exceeds fair value, less cost to sell. The amount of the impairment of long-lived assets is written off against earnings in the period in which the impairment is determined.

Business Acquisitions

Business acquisitions are accounted for using the acquisition method under Accounting Standards Codification (“ASC”) 805, *Business Combinations* (“ASC 805”), which requires recording assets acquired and liabilities assumed at fair value as of the acquisition date. Under the acquisition method of accounting, each tangible and separately identifiable intangible asset acquired and liabilities assumed is recorded based on their preliminary estimated fair values on the acquisition date. The initial valuations are derived from estimated fair value assessments and assumptions used by management. Acquisition related costs are expensed as incurred and are included in “Selling, general and administrative expenses” in the Consolidated Statements of Operations.

Leases

We determine if a contract is or contains a lease at inception of the contract. Our leases are primarily operating leases. Leased assets primarily include office buildings, rail cars and motor vehicles, forklifts, and other machinery and equipment. Our leases primarily have fixed lease payments, with real estate leases typically requiring additional payments for real estate taxes and occupancy-related costs. Certain of our leases also have variable lease payments. Variable lease payments that depend on an index or a rate (such as the Consumer Price Index) are included in our initial measurement of the lease right of use assets and lease liabilities. Variable lease payments that are not index or rate based (such as variable payments based on our performance or use of the leased assets) are recorded as expenses when incurred and excluded from the measurement of right of use assets and lease liabilities. Our leases typically have initial lease terms ranging from 1 to 25 years. Some of our lease agreements include options to renew, extend or early terminate the leases. Lease term is the non-cancellable period of a lease, adjusted by the period covered by an option to extend or terminate the lease if we are reasonably certain to exercise (or not exercise) that option. Our operating leases typically do not contain purchase options we expect to exercise, residual value guarantees or other material covenants.

Operating leases are recorded under “Lease right of use assets”, “Short-term lease liabilities”, and “Long-term lease liabilities” on the Consolidated Balance Sheets. Finance leases are recorded under “Property, plant and equipment net”, “Long-term debt due within one year”, and “Long-term debt” on the Consolidated Balance Sheets. Operating lease right of use ("ROU") assets and lease liabilities are initially recorded at the present value of the future minimum lease payments over the lease term at the commencement date or the acquisition date for leases acquired in the Cristal Transaction. As most of our leases do not provide an implicit rate, we use our incremental borrowing rate based on the information available at the lease commencement date in determining the present value of future payments. Lease payments for the initial measurement of lease ROU assets and lease liabilities include fixed payments and variable payments that depend on an index or a rate. Variable lease payments that are not index or rate based are recorded as expenses when incurred. Operating lease ROU assets are amortized on a straight-line basis over the period of the lease. Finance lease ROU assets are amortized on a straight-line basis over the shorter of their estimated useful lives of leased asset and the lease terms. See Note 18.

Long-term Debt

Long-term debt is stated net of unamortized original issue premium or discount. Premiums or discounts are amortized using the effective interest method with amortization expense recorded in “Interest and debt expense, net” in the Consolidated Statements of Operations. Deferred debt issuance costs related to a recognized debt liability are presented in the Consolidated Balance Sheets as a direct deduction from the carrying amount of that debt liability, consistent with debt discounts and are amortized using the effective interest method with amortization expense recorded in “Interest and debt expense, net” in the Consolidated Statements of Operations. See Note 15.

Asset Retirement Obligations

Asset retirement obligations are recorded at their estimated fair value, and accretion expense is recognized over time as the discounted liability is accreted to its expected settlement value. Fair value is measured using expected future cash outflows discounted at our credit-adjusted risk-free interest rate, which are considered Level 3 inputs. We classify accretion expense related to asset retirement obligations as a production cost, which is included in “Cost of goods sold” in the Consolidated Statements of Operations. See Note 19.

Environmental Remediation and Other Contingencies

We record an undiscounted liability when litigation has commenced or a claim or assessment has been asserted, or, based on available information, commencement of litigation or assertion of a claim or assessment is probable, and the associated costs can be reasonably estimated. See Note 20.

Self-Insurance

We are self-insured for certain levels of general and vehicle liability, property, workers’ compensation and health care coverage. The cost of these self-insurance programs is accrued based upon estimated fully developed settlements for known and anticipated claims. Any resulting adjustments to previously recorded reserves are reflected in current operating results. We do not accrue for general or unspecific business risks.

Share-based Compensation

Equity Restricted Share and Restricted Share Unit Awards — The fair value of equity instruments is measured based on the share price on the grant date and is recognized over the vesting period. These awards contain service, market, and/or performance conditions. For awards containing only a service or a market condition, we have elected to recognize compensation costs using the straight-line method over the requisite service period for the entire award. For awards containing a market condition, the fair value of the award is measured using the Monte Carlo simulation under a lattice model approach. For awards containing a performance condition, the fair value is the grant date close price and compensation expense is not recognized until we conclude that it is probable that the performance condition will be met. We reassess the probability at least quarterly. See Note 22.

Defined Benefit Pension and Postretirement Benefit Plans

We recognize the funded status of our defined benefit pension plans and postretirement benefit plans in the Consolidated Balance Sheets. The funded status is measured as the difference between the fair value of plan assets and the benefit obligation at the measurement date. The benefit obligation for the defined benefit plans is the projected benefit obligation (PBO), which represents the actuarial present value of benefits expected to be paid upon retirement based on employee services already rendered and estimated future compensation levels. The benefit obligation for our postretirement benefit plans is the accumulated postretirement benefit obligation (APBO), which represents the actuarial present value of postretirement benefits attributed to employee services already rendered. The fair value of plan assets related to our defined benefit plan represents the current market value of assets held in a trust fund, which is established for the sole benefit of plan participants.

If the fair value of plan assets exceeds the benefit obligation, the plan is overfunded, and the excess is recorded as a prepaid pension asset. On the other hand, if the benefit obligation exceeds the fair value of plan assets, the plan is underfunded, and the deficit is recorded as pension and postretirement healthcare benefits obligation in the Consolidated Balance Sheet. The portion of the pension and postretirement healthcare obligations payable within the next 12 months is recorded in accrued liabilities in the Consolidated Balance Sheet.

Net periodic pension and postretirement benefit cost represents the aggregation of service cost, interest cost, expected return on plan assets, amortization of prior service costs or credits and actuarial gains or losses previously recognized as a component of OCI and it is recorded in the Consolidated Statement of Operations. Net periodic cost is recorded in cost of goods sold and selling, general and administrative expenses in the Consolidated Statement of Operations based on the employees' respective functions.

Actuarial gains or losses represents the effect of remeasurement on the benefit obligation principally driven by changes in the plan actuarial assumptions. Prior service costs or credits arise from plan amendments. The actuarial gains or losses and prior service costs or credits are initially recognized as a component of Other Comprehensive income in the Consolidated Statement of Comprehensive Income (Loss). Those gains or losses and prior service costs or credits are subsequently recognized as a component of net periodic cost.

The measurement of benefit obligations and net periodic cost is based on estimates and assumptions approved by management. These valuations reflect the terms of the plans and use participant-specific information such as compensation, age and years of service, as well as certain assumptions, including estimates of discount rates, expected return on plan assets, rate of compensation increases and mortality rates.

Defined Contribution Plans — We recognize our contribution as expense when they are due. The expense is recorded in cost of goods sold or selling, general and administrative expenses the Consolidated Statement of Operations based on the employees' respective functions.

Multiemployer Plan — We treat our multiemployer plan like a defined contribution plan. A pension plan to which two or more unrelated employers contribute is generally considered to be a multiemployer plan. As a defined contribution plan, we recognize the contribution for the period as a net benefit cost and any contributions due and unpaid as a liability.

Recently Adopted Accounting Pronouncements

In August 2018, the FASB issued ASU 2018-13, *Fair Value Measurement ("Topic 820"): Disclosure Framework - Changes to the Disclosure Requirements for Fair Value Measurement.* The standard modifies the disclosure requirements in Topic 820, Fair Value Measurement, by: removing certain disclosure requirements related to the fair value hierarchy; modifying existing disclosure requirements related to measurement uncertainty; and adding new disclosure requirements, such as disclosing the changes in unrealized gains and losses for the period included in other comprehensive income for recurring Level 3 fair value measurements held at the end of the reporting period and disclosing the range and weighted average of significant unobservable inputs used to develop Level 3 fair value measurements. This standard is effective for fiscal years and interim periods within those fiscal years beginning after December 15, 2019, with early adoption permitted. We adopted this standard on January 1, 2020 and it did not have a material impact on the Company's consolidated financial statements.

In June 2016, the FASB issued ASU 2016-13, Financial Instruments - Credit Losses (Topic 326), as amended. The standard introduces a new accounting model for expected credit losses on financial instruments, including trade receivables, based on estimates of current expected credit losses (CECL). This standard became effective on January 1, 2020, and had an immaterial impact on the Company's consolidated financial statements as our historical bad debt expense has not been material.

Recently Issued Accounting Pronouncements

In December 2019, the FASB issued ASU 2019-12, Income Taxes ("Topic 740"): Simplifying the Accounting for Income Taxes. The standard simplifies the accounting for income taxes by removing the exceptions to the incremental approach for intraperiod tax allocation, the requirement to recognize deferred tax liability for equity method investments, the ability not to recognize a deferred tax liability for a foreign subsidiary when a foreign equity method investment becomes a subsidiary, and the general methodology for calculating income taxes in an interim period when a year-to-date loss exceeds the anticipated loss for the year. This standard is effective for fiscal years and interim periods within those fiscal years beginning after December 15, 2020 with early adoption permitted. We do not believe this standard will have a material impact on our consolidated financial statements.

In March 2020, the FASB issued ASU 2020-04, "Reference Rate Reform (Topic 848): Facilitation of the Effects of Reference Rate Reform Financial Reporting". This amendment is elective in nature. Amongst other aspects, this standard provides for practical expedients and exceptions to current accounting standards that reference a rate which is expected to be dissolved (e.g. London Interbank Offered Rate "LIBOR") as it relates to hedge accounting, contract modifications and other transactions that reference this rate, subject to meeting certain criteria. The standard is effective for all entities as of March 12, 2020 through December 31, 2022. The Company is currently evaluating the impact of the standard.

3. Acquisitions and Related Divestitures

TTI Acquisition

In May 2020, the Company announced that it had signed a definitive agreement to acquire the Tizir Titanium and Iron ("TTI") business from Eramet S.A. for approximately $300 million in cash, plus 3% per annum which accrues for the period from January 1, 2020 until the transaction closes. TTI is a titanium smelter located in Tyssedal, Norway which upgrades ilmenite to produce high-grade titanium slag and high-purity pig iron with an annual capacity of approximately 230,000 tons and 90,000 tons, respectively.

Pursuant to the definitive agreement, we were required to pay to Eramet S.A. a termination fee of $ 18 million if the agreement is terminated as a result of a failure to satisfy certain regulatory approvals prior to May 13, 2021. During the second quarter of 2020, upon signing of the definitive agreement to acquire TTI, we placed $18 million into an escrow account with a third-party financial institution.

One of the conditions to the transaction was the obtaining of certain regulatory approvals that would include UK Competition and Markets Authority ("CMA") approval by no later than a date specified in the definitive agreement (the "Condition Satisfaction Date"). On January 4, 2021, the Company received a decision from the CMA indicating that it intended to open a Phase 2 investigation into the Company's proposed acquisition of TTI. In response to the concerns presented by the CMA, the Company submitted a remedy proposal, which the CMA rejected on January 18, 2021. As a result of this rejection, the Company concluded that it is not possible to complete the transaction by the Condition Satisfaction Date and elected to terminate the transaction. On January 19, 2021, pursuant to the definitive agreement the $18 million previously placed into escrow was released to Eramet in satisfaction of the termination fee. At December 31, 2020, the $18 million is reflected within "Restricted cash" on the Consolidated Balance Sheet. Our subsequent decision in January 2021 to terminate the transaction and pay the $18 million termination fee did not otherwise impact our 2020 financial statements.

Cristal Acquisitions and Related Divestitures

On April 10, 2019, we completed the acquisition of the TiO_2 business of Cristal for $1.675 billion of cash, plus 37,580,000 ordinary shares. The total acquisition price, including the value of the ordinary shares at $14 per share on the closing date of the Cristal Transaction, was approximately $2.2 billion. With the acquisition of our shares, an affiliate of Cristal became our largest shareholder. At December 31, 2020, Cristal International Holdings B.V. (formerly known as Cristal Inorganic Chemical Netherlands Cooperatief W.A.), a wholly-owned subsidiary of The National Titanium Dioxide Company Limited., continues to own 37,580,000 shares of Tronox, or a 26% ownership interest. The National Titanium Dioxide Company Limited is 79% owned by Tasnee.

In order to obtain regulatory approval for the Cristal Transaction, the FTC required us to divest Cristal's North American TiO_2 business, which we sold to INEOS on May 1, 2019, for cash proceeds, net of transaction costs, of $701 million, inclusive of an amount for a working capital adjustment. The operating results of Cristal's North American TiO_2 business from the acquisition date to the date of divestiture are included in a single caption entitled "Net Income (Loss) from discontinued operations, net of tax" in our Consolidated Statements of Operations. See Note 6 for further information on discontinued operations.

In conjunction with the Cristal Transaction, we entered into a transition services agreement with Tasnee and certain of its affiliates under which we and the Tasnee entities will provide certain transition services to one another. See Note 24 for further details of the transition services agreement. In conjunction with the divestiture of Cristal's North American TiO_2 business to INEOS, we entered into a two-year transition services agreement with INEOS. Under the terms of the transition services agreement, INEOS agreed to provide services to Tronox for manufacturing, technology and innovation, information technology, finance, warehousing and human resources. Similarly, Tronox will provide services to INEOS for information technology, finance, product stewardship, warehousing and human resources.

In addition, in order to obtain regulatory approval by the European Commission, we divested the 8120 paper laminate grade, supplied from our Botlek facility in the Netherlands, to Venator Materials PLC ("Venator"). The divestiture was completed on April 26, 2019. Under the terms of the divestiture, we will supply the 8120 grade product to Venator under a supply agreement for an initial term of 2 years, and extendable up to 3 years, to allow for the transfer of the manufacturing of the 8120 grade to Venator. Total cash consideration is 8 million Euros, of which 1 million Euros was paid at the closing and 3.5 million Euros (or approximately $3.9 million) was received during the second quarter of 2020. The remaining 3.5 million Euros (approximately $4.3 million at December 31, 2020 exchange rate) will be paid in the second quarter of 2021. We recorded a charge of $19 million during the second quarter of 2019, in "Contract loss" in the Consolidated Statements of Operations, reflecting both the proceeds on sale and the estimated losses we expect to incur under the supply agreement with Venator.

We funded the cash portion of the Cristal Transaction through existing cash, borrowings from our Wells Fargo Revolver, and restricted cash which had been borrowed under the Blocked Term Loan (as defined elsewhere herein) and which became available to us for the purpose of consummating the Cristal Transaction. See Note 15 for further details of the Cristal Transaction financing.

Allocation of the Purchase Price

For the Cristal Transaction, we have applied the acquisition method of accounting in accordance with ASC 805, "Business Combinations", with respect to the identifiable assets and liabilities of Cristal, which have been measured at estimated fair value as of the date of the business combination.

The aggregate purchase price noted above was allocated to the identifiable assets acquired and liabilities assumed based upon their estimated fair values at the acquisition date, primarily using Level 2 and Level 3 inputs (see Note 2 for an explanation of Level 2 and Level 3 inputs). These fair value estimates represent management's best estimate of future cash flows (including sales, cost of sales, income taxes, etc.), discount rates, competitive trends, market comparables and other factors. Inputs used were generally determined from historical data supplemented by current and anticipated market conditions and growth rates.

During the first quarter of 2020, we finalized the purchase price allocation which resulted in increasing environmental liabilities by $8 million, increasing property, plant and equipment by $ 13 million, decreasing noncontrolling interest by $3 million, decreasing deferred taxes by $6 million, increasing liabilities held for sale by $5 million and decreasing inventory by $4 million, as well as other minor adjustments. The adjustments to the Consolidated Statement of Operations that would have been recognized in the second quarter of 2019 if the measurement period adjustments had been completed as of the acquisition date would have increased the net loss by approximately $1 million.

The final purchase price consideration and estimated fair value of Cristal's net assets acquired on April 10, 2019 are shown below. The assets and liabilities of Cristal's North American TiO_2 business, that was subsequently divested on May 1, 2019, are shown as held for sale in the fair value of assets acquired and liabilities assumed (refer to Note 6).

		Fair Value
Purchase Price Consideration:		
Tronox Holdings plc shares issued		37,580,000
Tronox Holdings plc closing price per share on April 10, 2019	$	14.00
Total fair value of Tronox Holdings plc shares issued at acquisition date	$	526
Cash consideration paid	$	1,675
Total Purchase Price	$	2,201

		Fair Value
Fair Value of Assets Acquired		
Accounts receivable	$	251
Inventory		689
Deferred taxes		51
Prepaid and other assets		81
Property, plant and equipment		759
Mineral leaseholds		95
Intangible assets		64
Lease right of use assets		40
Other long-term assets		43
Assets held for sale		850
Total assets acquired	$	2,923
Less: Liabilities Assumed		
Accounts payable	$	102
Accrued liabilities		137
Short-term lease liabilities		13
Deferred tax liabilities		2
Pension and postretirement healthcare benefits		76
Environmental liabilities		72
Asset retirement obligations		75
Long-term debt		22
Long-term lease liabilities		24
Other long-term liabilities		20
Liabilities held for sale		131
Total liabilities assumed	$	674
Less noncontrolling interest		48
Purchase price	$	2,201

Summary of Significant Fair Value Methods

The methods used to determine the fair value of significant identifiable assets and liabilities included in the allocation of purchase price are discussed below.

Inventory

Acquired inventory is comprised of finished goods, work in process and raw materials. The fair value of finished goods was calculated as the estimated selling price, adjusted for costs of the selling effort and a reasonable profit allowance relating to the selling effort. The fair value of work in process inventory was primarily calculated as the estimated selling price, adjusted for estimated costs to complete the manufacturing, estimated costs of the selling effort, as well as a reasonable profit margin on the remaining manufacturing and selling effort. The fair value of raw materials and supplies was determined based on historical carrying value which approximates fair value. The fair value step-up of inventories is being recognized in “Cost of sales” as the inventory is sold.

Assets held for sale and Liabilities of assets held for sale

As described above, in order to obtain regulatory approval for the acquisition, the U. S. FTC required us to divest Cristal's North American TiO_2 business, which we sold to INEOS on May 1, 2019, for cash proceeds, net of transaction costs, of $701 million. Refer to Note 6 for further information.

Property, Plant and Equipment

Property, plant and equipment (“PP&E”) is comprised of land and improvements of $ 92 million; machinery and equipment of $518 million; buildings of $90 million; and construction in progress of $59 million. The estimated fair value for PP&E was primarily determined using a replacement cost approach, although a market approach was used for land and certain types of equipment. The replacement cost approach measures the value of an asset by estimating the cost to acquire or construct comparable assets and adjusts for age and condition of the asset. The market approach represents a sales comparison that measures the value of an asset through an analysis of sales and offerings of comparable assets. Additionally, a discounted cash flow analysis (“Income Approach”) was used to quantify economic obsolescence (“EO”). An EO adjustment was made when the Income Approach indicated that there were insufficient cash flows to support the values established through the market and replacement cost approaches.

Mineral Leaseholds

The acquired assets of Cristal include mining operations in Australia. The fair value of these assets was determined using the income approach, specifically a discounted cash flow analysis ("DCF"). The DCF includes significant estimates and assumptions with respect to the expected production of the mine over the estimated time period, sales prices, profit margins and the discount rate. The calculated DCF value using this Income Approach was then reduced by the fair values determined for PP&E (see PP&E methodology) in order to derive the fair value of mineral leaseholds. There was no EO required for mining and mineral separation assets.

Intangible Assets

Intangible assets primarily consist of acquired developed technology. The values of the developed technology were determined utilizing the relief from royalty method, which is a form of Income Approach.

Pension and Other Postretirement Liabilities

Tronox recognized a pretax net liability representing the unfunded portion of Cristal’s defined-benefit pension and other postretirement benefit ("OPEB") plans.

Asset Retirement Obligations

Fair value is measured using expected future cash outflows discounted at our credit-adjusted risk-free interest rate. See Notes 2 and 19 to the consolidated financial statements for additional information.

Environmental Liabilities

Liabilities for environmental matters are recognized when remedial efforts are probable and the costs can be reasonably estimated. Such liabilities are based on our best estimate of the undiscounted future costs required to complete the remedial work. For further discussion, see Notes 2 and 20 to the consolidated financial statements.

Deferred Income Tax Assets and Liabilities

The deferred income tax assets and liabilities include tax loss carryforwards along with the expected future federal, state and foreign tax consequences associated with temporary differences between the preliminary fair values of the assets acquired and liabilities assumed and the respective tax bases. When applicable, valuation allowances were set up against deferred tax assets not expected to be realized. Tax rates utilized in calculating deferred income taxes represent the enacted statutory tax rates at the effective date of the merger in each respective jurisdiction. Refer to Note 8 for further information.

Noncontrolling Interests

Noncontrolling interest relates to Cristal’s historic noncontrolling interest in its publicly-traded Brazilian subsidiary. The fair value was calculated as a percentage of the fair value balance sheet of Cristal’s Brazilian subsidiary, which approximated the market capitalization of the subsidiary’s stock on the Brazilian stock exchange.

Other Assets Acquired and Liabilities Assumed

We utilized the carrying values, net of allowances, to value accounts receivable and accounts payable as well as other current assets and liabilities as it was determined that carrying values represented the fair value of those items at the acquisition date.

Supplemental Pro Forma Financial Information

The following unaudited pro forma information gives effect to the Cristal Transaction as if it had occurred on January 1, 2018. The unaudited pro forma financial information reflects certain adjustments related to the acquisition, such as:

a. conforming the accounting policies of Cristal to those applied by Tronox;
b. conversion to U.S. GAAP from IFRS for Cristal;
c. the elimination of transactions between Tronox and Cristal;
d. recording certain incremental expenses resulting from purchase accounting adjustments, such as inventory step-up amortization, depreciation, depletion and amortization expense in connection with fair value adjustments to property, plant and equipment, mineral leaseholds and intangible assets;
e. recording the contract loss on the sale of the 8120 product line as a charge in the first quarter of 2018;
f. recording all transaction costs incurred in the first quarter of 2018;
g. recording the effect on interest expense related to borrowings in connection with the Cristal Transaction; and
h. recording the related tax effects and the impacts to EPS for the shares issued in conjunction with the transaction.

The unaudited pro forma financial information should not be relied upon as being indicative of the historical results that would have been obtained if the Cristal Transaction had actually occurred on that date, nor the results of operations in the future.

In accordance with ASC 805, the supplemental pro forma results of operations for the years ended December 31, 2019 and 2018, as if the Cristal Transaction had occurred on January 1, 2018, are as follows:

	Year Ended December 31	
	2019	**2018**
Net Sales	$ 3,008	$ 3,339
Net income from continuing operations attributable to Tronox Holdings plc	$ 18	$ 32

For the year ended December 31, 2019, we incurred pre-tax charges of $98 million related to the recognition of the step up to fair value of inventories acquired. We also incurred a pre-tax charge of $19 million in contract losses incurred on the 8120 supply agreement with Venator for the year ended December 31, 2019. See Note 20. The 2019 pro forma results were adjusted to exclude these charges as these costs were reflected within the results of operations in the pro forma results as if they were incurred on January 1, 2018. For the year ended December 31, 2018, the pro forma results of operations reflect a pre-tax charges of $98 million related to the recognition of the step up to fair value of inventories acquired as well as the total $120 million of transaction costs.

4. Restructuring Initiatives

In April 2019, we announced the completion of the Cristal Transaction. During the second quarter of 2019, as a result of the acquisition, we outlined a broad-based synergy savings program that is expected to reduce costs, simplify processes and focus the organization’s structure and resources on key growth initiatives. During the years ended December 31, 2020 and 2019, we recorded costs of $3 million and $22 million, respectively, in our Consolidated Statement of Operations relating to these initiatives. The costs consisted of charges for employee-related costs, including severance.

The liability balance for restructuring as of December 31, 2020 and 2019, which is recorded within “Accrued liabilities” in the Consolidated Balance Sheet, is as follows:

	Employee-Related Costs
Balance, January 1, 2019	$ —
Charges	22
Cash payments	(12)
Balance, December 31, 2019	$ 10
Charges	3
Cash payments	(11)
Balance, December 31, 2020	$ 2

5. Revenue

Nature of Contracts and Performance Obligations

We primarily generate revenue from selling TiO_2 pigment products, products derived from titanium bearing mineral sands and related co-products, primarily zircon and pig iron, to our customers. These products are used for the manufacture of paints, coatings, plastics, paper, and a wide range of other applications. We account for a contract with our customer when it has approval and commitment from both parties, the rights of the parties are identified, payment terms are identified, the contract has commercial substance, and collectability of consideration is probable.

Our promise in a contract typically relates to the transferring of a product or multiple distinct products that are substantially the same and that have the same pattern of transfer, representing a single performance obligation within a contract. We have elected to account for shipping and handling activities that occur after control of the products has transferred to the customer as contract fulfillment activities, rather than a separate performance obligation. Amounts billed to a customer in a sales transaction related to shipping and handling activities continue to be reported as “Net sales” and related costs as “Cost of goods sold” in the Consolidated Statements of Operations.

The duration of our contract period is one year or less. As such, we have elected to recognize incremental costs incurred to obtain contracts, which primarily consist of commissions paid to third-party sales agents, as “Selling, general and administrative expenses” in the Consolidated Statements of Operations. Furthermore, we have elected not to disclose the value of unsatisfied performance obligations at each period end, given the original expected duration of our contracts are one year or less.

Transaction Price

Revenue is measured as the amount of consideration that we expect to be entitled in exchange for transferring products to the customer. The transaction price typically consists of fixed cash consideration. We also offer various incentive programs to our customers, such as rebates, discounts, and other price adjustments that represent variable consideration. We estimate variable consideration and include such consideration amounts in the transaction price to the extent it is probable that a significant reversal of cumulative revenue recognized will not occur when the uncertainty associated with the variable consideration is resolved. Our estimates of variable consideration and determination of whether to include estimated amounts in the transaction price are based largely on an assessment of our anticipated performance and all information (historical, current and forecasted) that is reasonably available to us. We adjust our estimate of revenue at the earlier of when the amount of consideration we expect to receive changes or when the consideration becomes fixed. Sales returns rarely happen in our business, therefore it is unlikely that a significant reversal of revenue will occur.

Sales and similar taxes we collect on behalf of governmental authorities are excluded from the transaction price for the determination of revenue. The expected costs associated with product warranties continue to be recognized as expense when the products are sold. Customer payment terms and conditions vary by contract and customer, although the timing of revenue recognition typically does not differ from the timing of invoicing. Additionally, as we generally do not grant extended payment terms, we have determined that our contracts generally do not include a significant financing component.

Revenue Recognition

We recognize revenue at a point in time when the customer obtains control of the promised products. For most transactions this occurs when products are shipped from our manufacturing facilities or at a later point when control of the products transfers to the customer at a specified destination or time.

Contract Balances

Contract assets represent our rights to consideration in exchange for products that have transferred to a customer when the right is conditional on situations other than the passage of time. For products that we have transferred to our customers, our rights to the consideration are typically unconditional and only the passage of time is required before payments become due. These unconditional rights are recorded as accounts receivable. As of December 31, 2020, and December 31, 2019, we did not have material contract asset balances.

Contract liabilities represent our obligations to transfer products to a customer for which we have received consideration from the customer. Infrequently we may receive advance payment from our customers that is accounted for as deferred revenue. Deferred revenue is earned when control of the product transfers to the customer, which is typically within a short period of time from when we received the advanced payment. Contract liability balances as of December 31, 2020 and December 31, 2019 were $4 million and $1 million, respectively. Contract liability balances were reported as “Accounts payable” in the Consolidated

Balance Sheets. All contract liabilities as of December 31, 2019 and 2018 were recognized as revenue in “Net sales” in the Consolidated Statements of Operations during the first quarter of 2020 and first quarter of 2019, respectively.

Disaggregation of Revenue

We operate under one operating and reportable segment, Tronox. See Note 25 for details. We disaggregate our revenue from contracts with customers by product type and geographic area. We believe this level of disaggregation appropriately depicts how the nature, amount, timing and uncertainty of our revenue and cash flows are affected by economic factors and reflects how our business is managed.

Net sales to external customers by geographic areas where our customers are located were as follows:

	Year Ended December 31,		
	2020	2019	2018
North America	$ 794	$ 696	$ 649
South and Central America	315	164	72
Europe, Middle-East and Africa	879	954	541
Asia Pacific	770	828	557
Total net sales	$ 2,758	$ 2,642	$ 1,819

Net sales from external customers for each similar type of product were as follows:

	Year Ended December 31,		
	2020	2019	2018
TiO_2	$ 2,176	$ 2,049	$ 1,230
Zircon	283	290	293
Feedstock and other products	299	303	259
Electrolytic	—	—	37
Total net sales	$ 2,758	$ 2,642	$ 1,819

Feedstock and other products mainly include pig iron, rutile prime, ilmenite, chloride slag and other mining products. Electrolytic products mainly include electrolytic manganese dioxide and boron. We sold our Electrolytic operations on September 1, 2018. See Note 6. The nature, amount, timing and uncertainty of revenue and cash flows typically do not differ significantly among different products.

6. Discontinued Operations and Other Disposition

Discontinued Operations - 2019

As discussed in Note 3, the Company divested Cristal's North American TiO_2 business to INEOS on May 1, 2019, for cash proceeds, net of transaction costs, of $701 million, inclusive of an amount for a working capital adjustment. The operating results of Cristal’s North American TiO_2 business from the acquisition date to the date of divestiture are included in a single caption entitled “Net income (loss) from discontinued operations, net of tax” in our Consolidated Statements of Operations and is included in the table below.

The following table presents a summary of the operations of Cristal’s North American TiO_2 business and Cristal Metals line items constituting the "Income from discontinued operations, net of tax" in our Consolidated Statements of Operations for the year ended December 31, 2019. There were no discontinued operations in 2020 and 2018.

	Year ended December 31, 2019
Net sales	$ 41
Cost of goods sold	29
Gross profit	12
Selling, general and administrative expense and other expenses	5
Income before income taxes	7
Income tax provision	2
Income from discontinued operations, net of tax	$ 5

Other Disposition - 2018

On September 1, 2018, Tronox LLC, our indirect wholly-owned subsidiary, sold to EMD Acquisition LLC certain of the assets and liabilities of our Henderson Electrolytic Operations based in Henderson, Nevada (the “Henderson Electrolytic Operations”), a component of our TiO_2 segment, for $1.3 million in cash and a Secured Promissory Note of $4.7 million. On December 27, 2018, we received the full settlement of the Promissory Note of $4.7 million from EMD Acquisition LLC. For the year ended December 31, 2018, a total pre-tax loss on the sale of $31 million was recorded in “Impairment loss” in the Consolidated Statements of Operations.

7. Other Income (Expense), Net

Other income (expense), net is comprised of the following:

	Year Ended December 31,		
	2020	2019	2018
Net realized and unrealized foreign currency gains (losses)	$ 4	$ 5	$ 29
Pension and postretirement benefit interest cost, expected return on assets and amortization of actuarial losses	1	(1)	(2)
Pension and postretirement benefit settlement and curtailment gains [1]	2	1	3
Insurance proceeds[2]	11	—	—
AMIC technical service support fee (Note 24)	5	—	—
Other, net	3	(2)	3
Total	$ 26	$ 3	$ 33

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(1) 2020 and 2019 amounts are curtailment gains related to our former U.S. Pension Plan (acquired as part of the Cristal Transaction). 2018 gain relates to our former U.S. retiree medical plan. See Note 23.

(2) 2020 amount represents reimbursement from claims related to the Ginkgo concentrator failure we inherited as a part of the Cristal Transaction.

8. Income Taxes

Our operations are conducted through various subsidiaries in a number of countries throughout the world. We have provided for income taxes based upon the tax laws and rates in the countries in which operations are conducted and income is earned.

Income (loss) from continuing operations before income taxes is comprised of the following:

	Year Ended December 31,		
	2020	2019	2018
United Kingdom	$ (12)	$ 56	$ (122)
International	126	(144)	165
Income (loss) from continuing operations before income taxes	$ 114	$ (88)	$ 43

The income tax (provision) benefit is summarized below:

	Year Ended December 31,		
	2020	2019	2018
United Kingdom:			
Current	$ (1)	$ —	$ (1)
Deferred	(10)	11	3
International:			
Current	(17)	(23)	(33)
Deferred	909	(2)	18
Income tax (provision) benefit	$ 881	$ (14)	$ (13)

The following table reconciles the applicable statutory income tax rates to our effective income tax rates for "Income tax (provision) benefit" as reflected in the Consolidated Statements of Operations.

	Year Ended December 31,		
	2020	2019	2018
Statutory tax rate	19 %	19 %	19 %
Increases (decreases) resulting from:			
Tax rate differences	10	5	24
Disallowable expenditures	17	(29)	88
Valuation allowances	(849)	(44)	(474)
Corporate Reorganization	(97)	—	—
Tax rate changes	(9)	17	41
State and local taxes	5	(7)	8
Prior year accruals	131	24	368
Branch taxation	—	(1)	(37)
Deferred gross margin	—	(4)	(9)
Other, net	—	4	2
Effective tax rate	(773)%	(16)%	30 %

Tronox Holdings plc, a U.K. public limited company, became the public parent during the three months ended March 31, 2019. Prior to that time, Tronox Limited, was the public parent, registered under the laws of the State of Western Australia, but managed and controlled in the U.K. The statutory tax rate in the U.K. at December 31, 2020, 2019 and 2018 was 19%.

The large negative effective tax rate for 2020 is caused by the release of valuation allowances for deferred tax assets in the U.S. and Brazil, partially offset by the recording of valuation allowances in Saudi Arabia and the U.K. The 2020 rate is additionally impacted by a corporate reorganization related to our Australian entities and the amendment of prior year returns in resolution of a tax audit which impacted prior year accruals (see below for further discussion regarding the audit agreement). Both of these impacts are fully offset by valuation allowances. The effective tax rates in 2020, 2019 and 2018 are all influenced by a variety of factors, primarily income and losses in jurisdictions with full valuation allowances, changes in tax rates, disallowable expenditures, and rates different than the United Kingdom statutory rate of 19%. The 2018 rate was additionally impacted by a benefit of $48 million due to the release of a valuation allowance for deferred tax assets associated with our operating subsidiary in the Netherlands.

The Company reached a settlement agreement with the Australian Tax Office ("ATO") on November 26, 2018 for the tax years 2012 through 2015 related to the Tronox companies operating in Australia, which were under examination by the ATO. This settlement resulted in the accrual of an $11 million current tax provision and the loss of $ 154 million in deferred tax assets related to Australian net operating losses ("NOLs"). The change to deferred taxes is fully offset by a valuation allowance and results in no impact to the consolidated provision. The settlement of $11 million was paid to the ATO in December 2018. Both the current tax provision and NOL adjustment from the ATO settlement are reflected in the "Prior year accruals" line of the effective tax rate table.

The Company reached an agreement with the ATO during the year ended December 31, 2020 for the tax years 2016 through 2019 related to the companies operating in Australia acquired in the Cristal Transaction, which were under examination by the ATO. Cash tax payments to be made pursuant to this agreement are not reflected in the above table due to the indemnification clause of the Cristal Transaction purchase contract. Refer to Note 24 for further information. As part of the agreement, $79 million in deferred tax assets related to Australian NOLs were lost. The change to deferred taxes is fully offset by a valuation allowance and results in no impact to the consolidated provision. The NOL adjustment from the ATO agreement is reflected in the "Prior year accruals" line of the effective tax rate table.

Changes in our state apportionment factors and state statutory rate changes caused our overall effective state tax rates to change. Due to the large deferred tax asset created by the Anadarko litigation settlement in 2014, these state rate changes have a material impact on deferred taxes for 2018, 2019, and 2020. These are reflected within the Tax rate changes line above. The changes to deferred tax are offset by valuation allowances for 2018 and 2019. During 2018, this line also includes the deferred tax impacts of tax rate reductions enacted in the Netherlands and the U.K. During 2020 and 2019, tax law changes fully repealed the future Netherlands rate reduction, and this benefit is also reflected in the Tax rate changes line.

Net deferred tax assets (liabilities) at December 31, 2020 and 2019 were comprised of the following:

	December 31,	
	2020	2019
Deferred tax assets:		
Net operating loss and other carryforwards	$ 1,788	$ 1,899
Property, plant and equipment, net	153	115
Reserves for environmental remediation and restoration	46	45
Obligations for pension and other employee benefits	57	58
Investments	3	28
Grantor trusts	637	615
Inventories, net	8	10
Interest	232	243
Lease liabilities	21	27
Other accrued liabilities	6	10
Foreign exchange	1	—
Other	8	11
Total deferred tax assets	2,960	3,061
Valuation allowance associated with deferred tax assets	(1,826)	(2,791)
Net deferred tax assets	1,134	270
Deferred tax liabilities:		
Inventories, net	(2)	(6)
Property, plant and equipment, net	(226)	(242)
Intangible assets, net	(30)	(45)
Lease assets	(22)	(28)
Foreign exchange	—	(9)
Other	(10)	(14)
Total deferred tax liabilities	(290)	(344)
Net deferred tax liability	$ 844	$ (74)
Balance sheet classifications:		
Deferred tax assets — long-term	$ 1,020	$ 110
Deferred tax liabilities — long-term	$ (176)	$ (184)
Net deferred tax liability	$ 844	$ (74)

For the year ended December 31, 2019, the application of business combination accounting for the Cristal Transaction resulted in the remeasurement of deferred income taxes associated with the assets and liabilities of the acquired entities at fair value pursuant to ASC 805. As a result, net deferred tax assets of $49 million were recorded in accordance with ASC 740. Significant changes by category impacted by the acquisition were related to net operating loss and other carryforwards of $186 million, Property, plant, and equipment of $ 49 million, and Reserves for environmental remediation and restoration of $23 million under deferred tax assets and to Property, plant and equipment of ($ 49) million and Inventories of ($30) million under deferred tax liabilities in the above table. Acquired companies in certain jurisdictions also included valuation allowances in Australia, Brazil, Switzerland, and the United Kingdom of ($123) million of the value in the above table.

The net deferred tax liabilities reflected in the above table include deferred tax assets related to grantor trusts, which were established as Tronox Incorporated emerged from bankruptcy during 2011. The balances relate to the assets contributed to such grantor trusts by Tronox Incorporated and the proceeds from the resolution of previous litigation of $5.2 billion during 2014, which resulted in additional deferred tax assets of $2.0 billion. This increase was initially offset by valuation allowances. As the grantor trusts continue to spend funds received from the litigation and earn income from the investment of those funds, the U.S. net operating loss will increase or decrease.

There was a decrease to our valuation allowance of $965 million during 2020, an increase of $172 million in 2019, and a decrease of $205 million in 2018. The table below sets forth the changes, by jurisdiction:

	December 31,		
	2020	2019	2018
United Kingdom	$ (1)	$ (2)	$ 8
United States	(944)	54	(12)
Australia	(17)	89	(144)
The Netherlands	2	—	(57)
Saudi Arabia	11	—	—
Brazil	(14)	14	—
Switzerland	—	15	—
Belgium	(2)	2	—
Total (decrease) increase in valuation allowances	$ (965)	$ 172	$ (205)

As part of the functions under business combination accounting pursuant to ASC 805 and deferred income taxes in accordance with ASC 740, the Company evaluated deferred tax attributes in each jurisdiction for application of a valuation allowance. Some operations acquired in the Cristal Transaction included a full or partial valuation allowance at the time of acquisition. Evidence provided to the Company that was maintained previously to support valuation allowances at acquisition was used along with considerations of any changes in operations and possible combinations with deferred tax attributes of the Company’s existing operations in each jurisdiction. It was determined that France would remove its valuation allowance so that jurisdiction is not shown in the table above, Australia and Brazil would increase from partial to full valuation allowances, and Switzerland and the United States would sustain full valuation allowances at acquisition.

During the year ended December 31, 2020, we determined sufficient positive evidence existed to reverse a portion of the valuation allowance attributable to the deferred tax assets associated with our operations in the U.S. This reversal resulted in a non-cash deferred tax benefit of $909 million. Our analysis considered all positive and negative evidence, including (i) three years of cumulative income for our U.S. subsidiaries, (ii) our continuing and improved profitability over the last twelve months in this jurisdiction, (iii) estimates of continued profitability based on updates to our latest forecasts, (iv) changes in the factors that drove losses in the past, primarily interest expenses incurred in the U.S., and (v) risk that certain deferred tax assets may be subject to limitation under Section 382 of the Code. Based on this analysis, we concluded that it was more likely than not that our U.S. subsidiaries will be able to utilize all of their deferred tax assets with an indefinite life. A portion of the U.S. deferred tax assets are attributable to NOLs incurred in prior years which are subject to expiration in future years. Our analysis did not support that these limited-life NOLs would be utilized before their expiration, and it is against these deferred tax assets in the U.S. that the Company continues to carry a valuation allowance with a current estimated value of $1,044 million.

During the year ended December 31, 2020, we also determined sufficient positive evidence existed to reverse the valuation allowance attributable to the deferred tax assets associated with our operations in Brazil. This reversal resulted in a non-cash deferred tax benefit of $8 million. Our analysis considered all positive and negative evidence, the most significant of which was the continuing and improved profitability of the Brazilian company subsequent to its acquisition in 2019 and estimates of continued profitability based on updates to our latest forecasts. Based on this analysis, we concluded that it is more likely than not that our Brazilian subsidiary will be able to utilize all of its deferred tax assets.

During the year ended December 31, 2020, we established a valuation allowance against the net deferred tax assets in the United Kingdom. The addition of this valuation allowance resulted in a non-cash deferred tax provision of $10 million. There has been increased profitability in this jurisdiction after the Cristal Transaction; however, it has not yet been sufficient to overcome our cumulative historical losses. Forecasted changes to intercompany interest is recent negative evidence now impacting our analysis. The company expects continued profitability in this jurisdiction but no longer has objective support which can be heavily weighted in this determination.

During the year ended December 31, 2020, we established a valuation allowance against the net deferred tax assets in Saudi Arabia. The addition of this valuation allowance resulted in a non-cash deferred tax provision of $2 million.

We released the valuation allowance of the operating entity in the Netherlands in 2018. During the period ended June 30, 2018, the Company had accumulated enough objective positive evidence to support the prospective use of its deferred tax assets held by the operating entity in the Netherlands. The valuation allowance in Australia decreased following the Company’s settlement which reduced its prior year NOLs. This was partially offset by current year losses in Australia.

At December 31, 2020, we have full valuation allowances related to the total net deferred tax assets in Australia, Switzerland, and the United Kingdom, as we cannot objectively assert that these deferred tax assets are more likely than not to be realized. It is reasonably possible that a portion of these valuation allowances could be reversed within the next year due to increased book profitability levels. Future provisions for income taxes will include no tax benefits with respect to losses incurred and tax expense only to the extent of current tax payments until the valuation allowances are eliminated. Additionally, we have valuation allowances against specific tax assets in the Netherlands, South Africa, and the U.S.

These conclusions were reached by the application of ASC 740, *Income Taxes*, and require that all available positive and negative evidence be weighted to determine whether a valuation allowance should be recorded. The more significant evidential matter in Australia, the Netherlands, Switzerland, and the United Kingdom relates to cumulative book losses. The most significant evidential matter for South Africa relates to capital losses and assets that cannot be depleted or depreciated for tax purposes.

An ownership change occurred during 2019 for the Cristal U.S. businesses as a result of the acquisition by the Company. These ownership changes resulted in a limitation under Sections 382 and 383 of the Internal Revenue Code related to the net operating losses of the Cristal U.S. businesses. The net limitations related to the ownership change resulted in a reduction of $69 million of the acquired U.S. loss carryforward, offset by corresponding reduction to a valuation allowance. The Company did not have any transactions during 2019 that triggered an ownership change under Sections 382 and 383 of the Code for the Tronox U.S. businesses.

The deferred tax assets generated by tax loss carryforwards in Australia, Switzerland, and the United Kingdom have been fully offset by valuation allowances. In the United States, the deferred tax assets generate by tax loss carryforwards are partially offset by a valuation allowance to the extent they are subject to expiration. The expiration of these carryforwards at December 31, 2020 is shown below. The Australian, Saudi Arabian, French, Brazilian and United Kingdom tax loss carryforwards do not expire.

	2021	2022	2023	2024	2025	2026 - 2039	Unlimited	Total Tax Loss Carryforwards
United Kingdom	$ —	$ —	$ —	$ —	$ —	$ —	$ (62)	$ (62)
Australia	—	—	—	—	—	—	(358)	(358)
The Netherlands	(8)	(35)	(39)	(19)	(26)	(131)	—	(258)
France	—	—	—	—	—	—	(242)	(242)
Saudi Arabia	—	—	—	—	—	—	(37)	(37)
Switzerland	—	(101)	(80)	—	—	—	—	(181)
U.S. Federal	—	—	—	—	—	(4,082)	(320)	(4,402)
U.S. State	(3)	(3)	(25)	(12)	(41)	(4,073)	(18)	(4,175)
Other	—	—	—	—	—	—	(7)	(7)
Total tax loss carryforwards	$ (11)	$ (139)	$ (144)	$ (31)	$ (67)	$ (8,286)	$ (1,044)	$ (9,722)

At December 31, 2020, Tronox Holdings plc had foreign subsidiaries with undistributed earnings. Although we would not be subject to income tax on these earnings, amounts totaling $266 million could be subject to withholding tax if distributed. We have made no provision for deferred taxes for Tronox Holdings plc related to these undistributed earnings because they are considered to be indefinitely reinvested outside of the parents' taxing jurisdictions.

The noncurrent liabilities section of our Consolidated Balance Sheet does not reflect any reserves for uncertain tax positions for either 2020 or 2019.

Our Chinese returns are closed through 2014. Our Australian, South African, and Brazilian returns are closed through 2015. Our U.K. and U.S. returns are closed through 2016. Our Netherlands and French returns are closed through 2017.

We believe that we have made adequate provision for income taxes that may be payable with respect to years open for examination; however, the ultimate outcome is not presently known and, accordingly, additional provisions may be necessary and/or reclassifications of noncurrent tax liabilities to current may occur in the future.

9. Income (Loss) Per Share

The computation of basic and diluted income per share for the periods indicated is as follows:

	Year Ended December 31, 2020	2019	2018
Numerator – Basic and Diluted:			
Net income (loss) from continuing operations	$ 995	$ (102)	$ 30
Less: Net income from continuing operations attributable to noncontrolling interest	26	12	37
Undistributed net income (loss) from continuing operations attributable to Tronox Holdings plc	969	(114)	(7)
Net income from discontinued operations available to ordinary shares	—	5	—
Net income (loss) available to ordinary shares	$ 969	$ (109)	$ (7)
Denominator – Basic and Diluted:			
Weighted-average ordinary shares, basic (in thousands)	143,355	139,859	122,881
Weighted-average ordinary shares, diluted (in thousands)	144,906	139,859	122,881
Net income (loss) per Ordinary Share:			
Basic net income (loss) from continuing operations per ordinary share	$ 6.76	$ (0.81)	$ (0.06)
Basic net income (loss) from discontinued operations per ordinary share	—	0.03	—
Basic net income (loss) per ordinary share	$ 6.76	$ (0.78)	$ (0.06)
Diluted net income (loss) from continuing operations per ordinary share	$ 6.69	$ (0.81)	$ (0.06)
Diluted net income (loss) from discontinued operations per ordinary share	—	0.03	—
Diluted net income (loss) per ordinary share	$ 6.69	$ (0.78)	$ (0.06)

Net income per ordinary share amounts were calculated from exact, unrounded net loss and share information. Prior to January 2019, we had issued shares of restricted stock which were participating securities that did not have a contractual obligation to share in losses; therefore, when we have a net loss, none of the loss is allocated to these participating securities. The restricted stock vested on January 29, 2019. Consequently, for the years ended December 31, 2020, 2019 and 2018, the two-class method did not have an effect on our net loss per ordinary share calculation, and as such, dividends paid during these periods did not impact this calculation.

In computing diluted net income per share under the two-class method, we considered potentially dilutive shares. Anti-dilutive shares not recognized in the diluted net income per share calculation for the years ended December 31, 2020, 2019 and 2018 were as follows:

	Shares 2020	2019	2018
Options	1,201,891	1,260,902	1,319,743
Restricted share units	1,054,994	5,557,659	5,336,433

Series A and Series B Warrants expired on February 14, 2018.

10. Inventories, net

Inventories, net consisted of the following:

	December 31, 2020	December 31, 2019
Raw materials	$ 170	$ 205
Work-in-process	103	129
Finished goods, net	668	573
Materials and supplies, net	196	224
Inventories, net - current	$ 1,137	$ 1,131

Materials and supplies, net consists of processing chemicals, maintenance supplies, and spare parts, which will be consumed directly and indirectly in the production of our products.

At December 31, 2020 and 2019, inventory obsolescence reserves were $41 million and $39 million, respectively. At December 31, 2020 and December 31, 2019, reserves for lower of cost and net realizable value were $29 million and $25 million, respectively.

11. Property, Plant and Equipment

Property, plant and equipment, net of accumulated depreciation, consisted of the following:

	December 31, 2020	December 31, 2019
Land and land improvements	$ 189	$ 191
Buildings	368	340
Machinery and equipment	2,197	2,028
Construction-in-progress	192	156
Other	86	54
Total	3,032	2,769
Less: accumulated depreciation	(1,273)	(1,007)
Property, plant and equipment, net	$ 1,759	$ 1,762

Substantially all the Property, plant and equipment, net is pledged as collateral for our debt. See Note 15.

The table below summarizes depreciation expense related to property, plant and equipment for the periods presented, recorded in the specific line items in our Consolidated Statements of Operations:

	Year Ended December 31, 2020	2019	2018
Cost of goods sold	$ 233	$ 189	$ 131
Selling, general and administrative expenses	5	5	3
Total	$ 238	$ 194	$ 134

12. Mineral Leaseholds, net

Mineral leaseholds, net of accumulated depletion, consisted of the following:

	December 31, 2020	December 31, 2019
Mineral leaseholds	$ 1,333	$ 1,352
Less accumulated depletion	(530)	(500)
Mineral leaseholds, net	$ 803	$ 852

Depletion expense related to mineral leaseholds during 2020, 2019, and 2018 was $33 million, $56 million, and $35 million, respectively, and was recorded in “Cost of goods sold” in the Consolidated Statements of Operations.

13. Intangible Assets, net

Intangible Assets, net of accumulated amortization, consisted of the following:

	December 31, 2020			December 31, 2019		
	Gross Cost	Accumulated Amortization	Net Carrying Amount	Gross Cost	Accumulated Amortization	Net Carrying Amount
Customer relationships	$ 291	$ (193)	$ 98	$ 291	$ (173)	$ 118
TiO_2 technology	93	(24)	69	92	(17)	75
Internal-use software and other	73	(39)	34	49	(34)	15
Intangible assets, net	$ 457	$ (256)	$ 201	$ 432	$ (224)	$ 208

As of December 31, 2020, internal-use software included approximately $19 million of capitalized software costs which are not being amortized as the software is not ready for its intended use.

The table below summarizes amortization expense related to intangible assets for the periods presented, recorded in the specific line items in our Consolidated Statements of Operations:

	Year Ended December 31,		
	2020	2019	2018
Cost of goods sold	$ 2	$ 2	$ 1
Selling, general and administrative expenses	31	28	25
Total	$ 33	$ 30	$ 26

Estimated future amortization expense related to intangible assets is $35 million for 2021, $36 million for 2022, $33 million for 2023, $32 million for 2024, $26 million for 2025 and $39 million thereafter.

14. Balance Sheet and Cash Flows Supplemental Information

Accrued liabilities consisted of the following:

	December 31,	
	2020	2019
Employee-related costs and benefits	$ 133	$ 103
Related party payables	7	7
Interest	21	16
Sales rebates	43	39
Restructuring	2	10
Taxes other than income taxes	16	6
Asset retirement obligations	9	16
Interest rate swaps	57	22
Professional fees and other	62	60
Liabilities held for sale	—	4
Accrued liabilities	$ 350	$ 283

Additional supplemental cash flow information for the year ended December 31, 2020 and 2019 and as of December 31, 2020 and December 31, 2019 is as follows:

Supplemental non cash information:	Year Ended December 31, 2020	Year Ended December 31, 2019
Investing activities- shares issued in the Cristal Transaction	$ —	$ 526
Financing activities- debt assumed in the Cristal Transaction	$ —	$ 22
Investing activities - Acquisition of MGT assets	$ 36	$ —
Financing activities - debt assumed in the acquisition of MGT assets	$ 36	$ —
	December 31, 2020	December 31, 2019
Capital expenditures acquired but not yet paid	$ 37	$ 23

15. Debt

Long-term Debt

Long-term debt, net of an unamortized discount and debt issuance costs, consisted of the following:

	Original Principal	Annual Interest Rate	Maturity Date	December 31, 2020	December 31, 2019
Term Loan Facility, net of unamortized discount[1]	$ 2,150	Variable	9/22/2024	$ 1,607	$ 1,805
Senior Notes due 2025	450	5.75 %	10/1/2025	450	450
Senior Notes due 2026	615	6.50 %	4/15/2026	615	615
6.5% Senior Secured Notes due 2025	500	6.50 %	5/1/2025	500	—
Standard Bank Term Loan Facility[1]	222	Variable	3/25/2024	115	158
Tikon Loan	N/A	Variable	5/23/2021	17	16
Australian Government Loan, net of unamortized discount	N/A	N/A	12/31/2036	1	1
MGT Loan[2]	36	Variable	Refer below	36	—
Finance leases				15	15
Long-term debt				3,356	3,060
Less: Long-term debt due within one year				(58)	(38)
Debt issuance costs				(35)	(34)
Long-term debt, net				$ 3,263	$ 2,988

[1]The average effective interest rate, including impacts of our interest rate swap, for the Term Loan Facility was 4.6% and 5.6% for the years ended December 31, 2020 and 2019, respectively. The average effective interest rate on the Standard Bank Term Loan Facility was 7.8% and 9.7% for the year ended December 31, 2020 and 2019, respectively.

[2]The MGT loan is a related party debt facility. Refer below for further details.

At December 31, 2020, the scheduled maturities of our long-term debt were as follows:

	Total Borrowings
2021	58
2022	44
2023	44
2024	1,631
2025	959
Thereafter	629
Total	3,365
Remaining accretion associated with the Term Loan Facility and Australian Government Loan	(9)
Total borrowings	3,356

Term Loan Facility

On September 22, 2017, we entered into a new senior secured first lien term loan facility (the “Term Loan Facility”) with the lenders party thereto and Bank of America, N.A., as administrative agent, with a maturity date of September 22, 2024. The Term Loan Facility consists of (i) a U.S. dollar term facility in an aggregate principal amount of $1.5 billion (the “Term Loans”) with our subsidiary, Tronox Finance LLC (“Tronox Finance”) as the borrower and (ii) a U.S. dollar term facility in an aggregate principal amount of $650 million (the “Blocked Term Loan”) with our unrestricted subsidiary, Tronox Blocked Borrower LLC (the “Blocked Borrower”) as the borrower, which Blocked Term Loan was funded into a blocked account. Upon consummation of the Cristal Transaction on April 10, 2019, the Blocked Borrower merged with and into Tronox Finance, and the Blocked Term Loan became available to Tronox Finance.

Pursuant to the terms of the Term Loan Facility in the event of an asset sale, some or all of the net proceeds from the sale may be required to be used to prepay borrowings under the Term Loan Facility based on the ratio of the total combined debt outstanding under the Term Loan Facility and the Wells Fargo Revolver to the consolidated EBITDA for the previous four quarters, as defined in the Term Loan Facility (the "First Lien Net Leverage Ratio"). If this ratio is greater than three, then all of the net proceeds from an asset sale would be required to be used to prepay borrowings under the Term Loan Facility, while if the ratio were less than three but greater than 2.75, 50% of the net proceeds would be required for prepayment and if the ratio were less than 2.75, no prepayment would be required. On May 1, 2019, we divested Cristal’s North American operations for approximately $701 million and subsequent to the sale, our First Lien Net Leverage Ratio was below 2.75, and, as a result, the sale of the North American operations did not trigger a prepayment event.

The Term Loan Facility bears interest at the “Applicable Rate” defined by reference to a grid-pricing matrix that relates to our First Lien Net Leverage Ratio. Based upon our First Lien Net Leverage Ratio the Applicable Rate under the Term Loan Facility as of December 31, 2020 was LIBOR plus a margin of 3.0%. The Term Loan Facility was issued net of an original issue discount of $11 million.

On February 25, 2019, we entered into an amendment to both our Term Loan Facility and Wells Fargo Revolver (as defined below). The purpose of each amendment was to make certain of our U.K. subsidiaries restricted subsidiaries, update the relevant indebtedness disclosure schedules to include certain inter-company indebtedness that had been in existence prior to the execution of each such facility, and waive an administrative omission under such facility. As a result of this amendment, the Company made two mandatory principal prepayments on the Term Loan Facility as follows: 1) $95 million subsequent to the issuance of the Standard Bank Term Loan Facility in March 2019 and 2) $100 million subsequent to the divestiture of the Cristal North American TiO_2 business. The Company accounted for both of these mandatory principal prepayments as debt modifications in accordance with ASC 470. Additionally, in December 2019, the Company made a voluntary prepayment of $100 million on the Term Loan Facility. As a result of the voluntary prepayment, we recorded $ 1 million in “Loss on extinguishment of debt” within the Consolidated Statement of Operations for the year ended December 31, 2019. No prepayment penalties were required as a result of these principal prepayments.

In December 2020, the Company made a voluntary prepayment of $ 200 million on the Term Loan Facility. As a result of the voluntary prepayment, we recorded $2 million in "Loss on extinguishment of debt" within the Consolidated Statement of Operations for the year ended December 31, 2020. No prepayment penalties were required as a result of this principal prepayment.

Senior Notes due 2025

On September 22, 2017, Tronox Finance plc, issued 5.75% senior notes due 2025 for an aggregate principal amount of $450 million (the “Senior Notes due 2025”), which notes were issued under an indenture dated September 22, 2017 (the “2025 Indenture”). The 2025 Indenture and the Senior Notes due 2025 provide among other things, that the Senior Notes due 2025 are senior unsecured obligations of Tronox Finance plc and are guaranteed on a senior and unsecured basis by us and certain of our other subsidiaries. The Senior Notes due 2025 have not been registered under the Securities Act, and may not be offered or sold in the U.S. absent registration or an applicable exemption from registration requirements. Interest is payable on April 1 and October 1 of each year beginning on April 1, 2018 until their maturity date of October 1, 2025. The terms of the 2025 Indenture, among other things, limit, in certain circumstances, the ability of us and certain of our subsidiaries to: incur secured indebtedness, engage in certain sale-leaseback transactions and merge, consolidate or sell substantially all of our assets. The terms of the 2025 Indenture also include certain limitations on our non-guarantor subsidiaries incurring indebtedness.

Senior Notes due 2026

On April 6, 2018, Tronox Incorporated issued 6.5% Senior Notes due 2026 for an aggregate principal amount of $ 615 million (“Senior Notes due 2026”). The 2026 Indenture and the Senior Notes due 2026 provide, among other things, that the Senior Notes due 2026 are senior unsecured obligations of Tronox Incorporated and are guaranteed on a senior and unsecured basis by us and certain of our other subsidiaries. The Senior Notes due 2026 have not been registered under the Securities Act and may not be offered or sold in the U.S. absent registration or an applicable exemption from registration requirements. Interest is payable on April 15 and October 15 of each year beginning on October 15, 2018 until their maturity date of April 15, 2026. The terms of the 2026 Indenture, among other things, limit, in certain circumstances, our and certain of our subsidiaries ability to: incur secured indebtedness; engage in certain sale-leaseback transactions; and merge, consolidate or sell substantially all of our assets. The terms of the 2026 Indenture also include certain limitations on our non-guarantor subsidiaries incurring indebtedness. The proceeds of the offering were used to fund the redemption of our Senior Notes due 2022. Debt issuance costs of $10 million related to the Senior Notes due 2026 were recorded as a direct reduction of the carrying value of the long-term debt. Additionally, in connection with the redemption of our Senior Notes due 2022, we recorded $30 million in debt extinguishment costs including a call premium of $ 22 million during the second quarter of 2018.

6.5% Senior Secured Notes due 2025

On May 1, 2020, Tronox Incorporated, a wholly-owned indirect subsidiary of the Company, issued 6.5% senior secured notes due 2025 for an aggregate principal amount of $500 million (the "6.5% Senior Secured Notes due 2025"), which were issued under an indenture dated May 1, 2020. A portion of the proceeds of this debt offering was utilized to repay the $200 million of the Company's outstanding borrowings under its Wells Fargo, Standard Bank, and Emirates revolvers which was originally borrowed during the first quarter of 2020 (as discussed below).

Standard Bank Term Loan Facility

On March 25, 2019, our South African subsidiaries, Tronox KZN Sands Proprietary Limited and Tronox Mineral Sands Proprietary Limited, entered into the Standard Bank Term Loan Facility with a maturity date of March 25, 2024. The Term Loan Facility consists of (i) an aggregate principal amount of R2.6 billion (“Amortizing Loan”, approximately $177 million at December 31, 2020 exchange rate) the principal of which will be paid back at 5 percent per quarter over the five year term of the loan, and (ii) an aggregate principal amount of R600 million (“Bullet Loan”) the principal of which was to be paid back at the maturity date of the Standard Bank Term Loan Facility. During the third quarter of 2019, we repaid the outstanding balance on the Bullet Loan.

The Amortizing Loan bears interest at JIBAR plus 260 basis points when net leverage of the South African subsidiaries is less than 1.5 and JIBAR plus 285 points when net leverage is greater than 1.5. At December 31, 2020, the outstanding principal amounts for the Amortizing Loan was R1.7 billion (approximately $115 million).

The Standard Bank Term Loan Facility contains financial covenants relating to certain ratio tests.

In January 2021, we made a voluntary prepayment of R 130 million (approximately $9 million at December 31, 2020 exchange rate) on the Standard Bank Term Loan Facility. No prepayment penalties were required as a result of this principal prepayment. As a result of this prepayment and pursuant to the loan agreement, the maturity date of the loan is accelerated to December 2023.

Tikon Loan

As part of the Cristal Transaction, we acquired a working capital debt agreement in China (“Tikon Loan”) that matures in April and May of 2021. The Tikon Loan bears interest based on an official lending basis rate per annum as announced and published by the People’s Bank of China plus a 7% premium. At December 31, 2020, the outstanding balance on the Tikon Loan was approximately CNY 111 million (approximately $17 million USD at December 31, 2020 exchange rate) which is recorded within "Long-term debt due within one year" on the Consolidated Balance Sheet.

In February 2021, we made a voluntary prepayment of CNY 41 million (approximately $6 million USD at December 31, 2020 exchange rate) on the Tikon Loan. No prepayment penalties were required as a result of this principal prepayment.

Australian Government Loan

As part of the Cristal Transaction, we acquired an interest-free loan with the Australian government ("Australian Government Loan") that matures in December 2021 subject to renewal every 5 years with final termination in December 2036. The loan balance due upon maturity is AUD 6 million (approximately $5 million at December 31, 2020). At December 31, 2020, the discounted value on the Australian Government Loan was approximately AUD 1.5 million (approximately $1 million at December 31, 2020 exchange rate).

MGT Loan

On December 17, 2020, we completed our agreement with Cristal to acquire certain assets co-located at our Yanbu facility which produce metal grade $TiCl_4$ ("MGT") in exchange for a $36 million note payable. Repayment of the note payable is based on a fixed U.S. dollar per metric ton quantity of MGT delivered by us to Advanced Metal Industries Cluster and Toho Titanium Metal Co. Ltd (ATTM) over time and therefore the ultimate maturity date is variable in nature. If ATTM fails to purchase MGT from us under certain contractually agreed upon conditions, then at our election we may terminate the MGT supply agreement with ATTM and will no longer owe any amount under the loan agreement with Cristal. We currently estimate the ultimate maturity to be between approximately five to seven years, subject to actual future MGT production levels. The interest rate is based on the Saudi Arabian Interbank Offered Rate ("SAIBOR") plus a premium. As of December 31, 2020, the outstanding balance of the note payable was $36 million, of which $5 million is expected to be paid within the next twelve months (recorded within "Long-term debt due within one year" on our Consolidated Balance Sheet). Refer to Note 24 for further information on the MGT transaction.

Short-term Debt

As of both December 31, 2020 and December 31, 2019, there were no short-term debt balances.

Wells Fargo Revolver

On September 22, 2017, we entered into a new global senior secured asset-based syndicated revolving credit facility with Wells Fargo Bank, N.A. (the "Wells Fargo Revolver"). The Wells Fargo Revolver which initially provided us with up to $550 million of revolving credit lines, with an $85 million sublimit for letters of credit, and has a maturity date of September 22, 2022. Our availability of revolving credit loans and letters of credit is subject to a borrowing base. Borrowings bear interest at our option, at either an adjusted London Interbank Offered Rate ("LIBOR") plus an applicable margin that ranges from 1.25% to 1.75%, or a base rate, which is defined to mean the greatest of (a) the administrative agent's prime rate, (b) the Federal funds effective rate plus 0.50% and (c) the adjusted LIBOR for a one month period plus 1.00% plus a margin that ranges from 0.25% to 0.75%, in each case, based on the average daily borrowing availability.

On March 22, 2019, we entered into a consent and amendment to the Wells Fargo Revolver and an amendment to our Term Loan Facility. The purpose of each amendment was to, among other things, (i) permit the refinancing of certain existing indebtedness incurred by our South African subsidiaries, Tronox KZN Sands Proprietary Limited and Tronox Mineral Sands Proprietary Limited, and the proposed uses of proceeds thereof, and (ii) implement required provisions in both the Wells Fargo Revolver and Term Loan Facility necessary in connection with the establishment of Tronox Holdings plc.

The Wells Fargo Revolver amendment also modified certain components of the borrowing base in order to increase the potential availability of credit. We also voluntarily reduced the revolving credit lines under the Wells Fargo Revolver from $550 million to $350 million. As a result of this modification, during the months ended March 31, 2019, we recorded a charge of $2 million in "Loss on extinguishment of debt" within the Consolidated Statement of Operations. At December 31, 2020, there were no outstanding revolving credit loans under the Wells Fargo Revolver, excluding $25 million of issued and undrawn letters of credit under the Wells Fargo Revolver. Debt issuance costs associated with the Wells Fargo Revolver of $2 million were included in "Other long-term assets" in the Consolidated Balance Sheets at December 31, 2020 and are being amortized over the life of the Wells Fargo Revolver.

The Wells Fargo Revolver contains a springing financial covenant that requires the Company and its restricted subsidiaries to maintain a consolidated fixed charge coverage ratio of at least 1.0:1.0 during certain test periods based on borrowing availability under the Wells Fargo Revolver or following the occurrence of specified events of default.

ABSA Revolving Credit Facility

In connection with the Standard Bank Revolver (defined below) entered into on March 25, 2019, discussed below, the ABSA Revolver was terminated on March 26, 2019. As a result of the termination, during the three months ended March 31, 2019, we recorded less than $1 million in “Loss on extinguishment of debt” within the Consolidated Statement of Operations.

Standard Bank Credit Facility

On March 25, 2019, our South African subsidiaries, Tronox KZN Sands Proprietary Limited and Tronox Mineral Sands Proprietary Limited, entered into the Standard Bank Credit Facility ("Standard Bank Revolver") for an amount up to R1 billion (approximately $68 million at December 31, 2020 exchange rate) maturing on March 25, 2022. The Standard Bank Credit Facility bears interest at the Johannesburg Interbank Average Rate (“JIBAR”) plus 260 basis points when net leverage for our South African subsidiaries (total combined debt outstanding under the Standard Bank Revolver and Standard Bank Term less cash and cash equivalents divided by the consolidated EBITDA) is less than 1.5 and JIBAR plus 285 basis points when net leverage is greater than 1.5. There were no balances outstanding at December 31, 2020.

Emirates Revolver

As part of the Cristal Transaction, we acquired a revolving credit facility with Emirates NBD PJSC. In March 2020, the Company entered into an amendment to, amongst other things, extend the maturity date of the Emirates Revolver from March 31, 2020 to March 31, 2021. Under the Emirates Revolver, we have the ability to borrow up to approximately $50 million. The revolver is secured by inventory and trade receivables of Cristal Pigment UK Ltd. Under the terms of the revolver, for U.S. dollar borrowings the interest rate is LIBOR plus 2.25% while the interest rate for Euro borrowings is Euribor plus 2.25%. There were no borrowings outstanding under this revolver at December 31, 2020.

SABB Credit Facility

On October 16, 2019, our KSA subsidiary entered into a short-term working capital facility with the Saudi British Bank (“SABB Facility”) for an amount up to SAR 70 million (approximately $19 million). The SABB Facility bears interest at the Saudi Inter Bank Offered Rate plus 180 basis points on outstanding balances. During October 2019, the Company borrowed SAR 50 million (or approximately $13 million) under the SABB Facility and subsequently repaid the outstanding balance in December 2019. Additionally, in March 2020, the Company borrowed SAR 50 million (or approximately $13 million) under the SABB Facility and subsequently repaid the outstanding balances. There is no borrowing outstanding under this facility at December 31, 2020. In December 2020, the Company extended the maturity date of the SABB Credit Facility from December 13, 2020 to November 30, 2021.

Debt Covenants

At December 31, 2020, we are in compliance with all financial covenants in our debt facilities.

Interest and Debt Expense, Net

Interest and debt expense, net in the Consolidated Statements of Operations consisted of the following:

	Year Ended December 31,		
	2020	2019	2018
Interest on debt	$ 174	$ 186	$ 180
Amortization of deferred debt issuance costs and discounts on debt	10	8	11
Capitalized interest	(2)	(1)	(3)
Interest on capital leases and letters of credit and commitments	7	8	5
Total interest and debt expense, net	$ 189	$ 201	$ 193

In connection with obtaining debt, we incurred debt issuance costs, which are being amortized through the respective maturity dates using the effective interest method for our long-term debt and on a straight-line basis for our Wells Fargo Revolver. At December 31, 2020 and December 31, 2019, we had deferred debt issuance costs of $2 million and $3 million, respectively, related to the Wells Fargo Revolver, which is recorded in “Other long-term assets” in the Consolidated Balance Sheets. At December 31, 2020 and December 31, 2019, we had debt discount of $9 million and $12 million, respectively, and debt issuance costs of $35 million and $34 million, respectively, primarily related to our term loan and senior notes, which were recorded as a direct reduction of the carrying value of the long-term debt in the Consolidated Balance Sheets.

16. Derivative Financial Instruments

Derivatives recorded on the Consolidated Balance Sheet:

The following table is a summary of the fair value of derivatives outstanding at December 31, 2020 and 2019:

	Fair Value			
	December 31, 2020		December 31, 2019	
	Assets(a)	Accrued Liabilities	Assets(a)	Accrued Liabilities
Derivatives Designated as Cash Flow Hedges				
Currency Contracts	$ 58	$ —	$ 30	$ —
Interest Rate Swaps	$ —	$ 57	$ —	$ 22
Total Hedges	$ 58	$ 57	$ 30	$ 22
Derivatives Not Designated as Cash Flow Hedges				
Currency Contracts	$ 7	$ —	$ 7	$ —
Total Derivatives	$ 65	$ 57	$ 37	$ 22

(a) At December 31, 2020, current assets of $65 million are recorded in prepaid and other current assets on the Consolidated Balance Sheet. At December 31, 2019, current assets of $34 million were recorded in prepaid and other current assets and long-term assets of $3 million are recorded in other long-term assets on the Consolidated Balance Sheet.

Derivatives' Impact on the Consolidated Statement of Operations

The following table summarizes the impact of the Company's derivatives on the Consolidated Statement of Operations:

	Amount of Pre-Tax Gain (Loss) Recognized in Earnings			Amount of Pre-Tax Gain (Loss) Recognized in Earnings		
	Revenue	Cost of Goods Sold	Other Income (Expense), net	Revenue	Cost of Goods Sold	Other Income (Expense), net
	Year Ended December 31, 2020			Year Ended December 31, 2019		
Derivatives Not Designated as Hedging Instruments						
Currency Contracts	$ —	$ —	$ 4	$ —	$ —	$ 7
Derivatives Designated as Hedging Instruments						
Currency Contracts	$ (7)	$ 3	$ —	$ 5	$ 3	$ —
Total Derivatives	$ (7)	$ 3	$ 4	$ 5	$ 3	$ 7

Interest Rate Risk

During the second quarter of 2019, we entered into interest-rate swap agreements with an aggregate notional value of $750 million representing a portion of our Term Loan Facility, which effectively converts the variable rate to a fixed rate for that portion of the loan. The agreements expire in September 2024. The Company's objectives in using the interest-rate swap agreements are to add stability to interest expense and to manage its exposure to interest rate movements. These interest rate swaps have been designated as cash flow hedges and involve the receipt of variable amounts from a counterparty in exchange for the Company making fixed-rate payments over the life of the agreements without exchange of the underlying notional amount.

Fair value gains or losses on these cash flow hedges are recorded in other comprehensive (loss) income and are subsequently reclassified into interest expense in the same periods during which the hedged transactions affect earnings. For the year ended December 31, 2020 and December 31, 2019, the amounts recorded in interest expense related to the interest-rate swap agreements were $10 million and less than $1 million, respectively. At December 31, 2020 and December 31, 2019, the net unrealized loss was $57 million and $22 million, respectively, and was recorded in "Accumulated other comprehensive loss" on the Consolidated Balance Sheet.

Foreign Currency Risk

During the third quarter of 2019 and the first quarter of 2020, we entered into foreign currency contracts used to hedge forecasted third party non-functional currency sales for our South African subsidiaries and forecasted non-functional currency cost of goods sold for our Australian subsidiaries. These foreign currency contracts are designated as cash flow hedges. Changes to the fair value of these foreign currency contracts are recorded as a component of other comprehensive (loss) income, if these contracts remain highly effective, and are recognized in net sales or costs of goods sold in the period in which the forecasted transaction affects earnings or are recognized in other income (expense) when the transactions are no longer probable of occurring.

As of December 31, 2020, we had notional amounts of 330 million Australian dollars (approximately $254 million at December 31, 2020 exchange rate) that expire between January 29, 2021 and December 30, 2021 to reduce the exposure of our Australian subsidiaries’ cost of sales to fluctuations in currency rates. All of our existing foreign currency contracts that reduced the exposure of our South African subsidiaries' third party sales to fluctuations in currency rates had expired as of December 31, 2020. At December 31, 2020 and December 31, 2019, there was an unrealized net gain of $58 million and an unrealized net gain of $30 million, respectively, recorded in "Accumulated other comprehensive loss" on the Consolidated Balance Sheet, which is expected to be recognized in earnings over the next twelve months.

From time to time, we enter into foreign currency contracts to reduce exposure of our subsidiaries’ balance sheet accounts not denominated in our subsidiaries’ functional currency to fluctuations in foreign currency exchange rates. For accounting purposes, these foreign currency contracts are not considered hedges. The change in fair value associated with these contracts is recorded in “Other income (expense), net” within the Consolidated Statement of Operations and partially offsets the change in value of third party and intercompany-related receivables not denominated in the functional currency of the subsidiary. At December 31, 2020, there was (i) 354 million South African Rand (or approximately $24 million at December 31, 2020 exchange rate) and (ii) 54 million Australian dollars (or approximately $41 million at December 31, 2020 exchange rate) of notional amount of outstanding foreign currency contracts.

17. Fair Value Measurement

For financial instruments that are subsequently measured at fair value, the fair value measurement is grouped into levels. See Note 2.

Our debt is recorded at historical amounts. The following table presents the fair value of our debt and derivative contracts at both December 31, 2020 and December 31, 2019:

	December 31, 2020	December 31, 2019
Term Loan Facility	$ 1,610	$ 1,820
Standard Bank Term Loan Facility	115	158
Senior Notes due 2025	468	459
Senior Notes due 2026	641	636
6.5% Senior Secured Notes due 2025	536	—
Tikon Loan	17	16
Australian Government Loan	1	1
MGT Loan	36	—
Interest rate swaps	57	22
Foreign currency contracts, net	65	37

We determined the fair value of the Term Loan Facility, the Senior Notes due 2025, the Senior Notes due 2026 and the 6.5% Senior Secured Notes due 2025 using quoted market prices, which under the fair value hierarchy is a Level 1 input. We determined the fair value of the Standard Bank Term Loan Facility and Tikon Loan utilizing transactions in the listed markets for similar liabilities, which under the fair value hierarchy is a Level 2 input. The fair value of the Australian Government Loan and MGT Loan is based on the contracted amount which is a Level 2 input.

We determined the fair value of the foreign currency contracts and interest rate swaps using inputs other than quoted prices in active markets that are observable either directly or indirectly. The fair value hierarchy for the foreign currency contracts and interest rate swaps is a Level 2 input.

The carrying value of cash and cash equivalents, restricted cash, accounts receivable and accounts payable approximate fair value due to the short-term nature of these items.

See Note 3, "Acquisitions and Related Divestitures", for the assets and liabilities measured on a non-recurring basis at fair value associated with our acquisition.

18. Leases

Lease expense for the year ended December 31, 2020 and December 31, 2019 was comprised of the following:

	Year Ended December 31,	
	2020	2019
Operating lease expense	$ 48	$ 41
Finance lease expense:		
Amortization of right-of-use assets	1	1
Interest on lease liabilities	2	2
Short term lease expense	26	22
Variable lease expense	22	20
Total lease expense	$ 99	$ 86

The table below summarizes lease expense for the year ended December 31, 2020 and December 31, 2019, recorded in the specific line items in our Consolidated Statements of Operations:

	Year Ended December 31,	
	2020	2019
Cost of goods sold	$ 91	$ 80
Selling, general and administrative expenses	8	6
Total	$ 99	$ 86

The weighted-average remaining lease term in years and weighted-average discount rates at December 31, 2020 and December 31, 2019 were as follows:

	December 31, 2020	December 31, 2019
Weighted-average remaining lease term:		
Operating leases	3.3	3.7
Finance leases	9.6	10.4
Weighted-average discount rate:		
Operating leases	7.7 %	8.5 %
Finance leases	14.2 %	14.2 %

The maturity analysis for operating leases and finance leases at December 31, 2020 were as follows:

	Operating Leases	Finance Leases
2021	$ 44	$ 3
2022	23	3
2023	9	3
2024	7	3
2025	2	3
Thereafter	6	12
Total lease payments	91	27
Less: imputed interest	(11)	(12)
Present value of lease payments	$ 80	$ 15

Financial information for the year ended December 31, 2018 is not presented under ASC 842 as we adopted the new standard using the modified retrospective adjustment approach in 2019. Total rent expense related to operating leases recorded in "Cost of goods sold" in the Consolidated Statement of Operations was $22 million during 2018. Total rent expense related to operating leases recorded in "Selling, general and administrative expense" in the Consolidated Statement of Operations was $2 million during 2018. During 2018, we made principal payments of less than $1 million for finance leases.

Additional information relating to cash flows and ROU assets for the year ended December 31, 2020 and 2019 is as follows:

	December 31, 2020	December 31, 2019
Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash flows used for operating leases	$ 55	$ 41
Operating cash flows used for finance leases	$ 2	$ 2
Financing cash flows used for finance leases	$ 1	$ 1

Additional information relating to ROU assets for the year ended December 31, 2020 and 2019 is as follows:

	Year Ended December 31,	
	2020	2019
ROU assets obtained in exchange for lease obligations:		
Operating leases obtained in the normal course of business	$ 29	$ 28
Operating leases acquired in connection with Cristal acquisition	$ —	$ 40

As of December 31, 2020, we have additional operating leases, primarily for equipment and machinery, that have not yet commenced. The related ROU asset is approximately $63 million. These leases will commence later in 2022 with lease terms of approximately 15 years.

19. Asset Retirement Obligations

Asset retirement obligations consist primarily of rehabilitation and restoration costs, landfill capping costs, decommissioning costs, and closure and post-closure costs. Activity related to asset retirement obligations was as follows:

	Year Ended December 31, 2020	Year Ended December 31, 2019
Balance, January 1	$ 158	$ 74
Additions	1	3
Accretion expense	12	10
Remeasurement/translation	7	—
Changes in estimates, including cost and timing of cash flows	(1)	(8)
Settlements/payments	(15)	(4)
Transferred in with the acquisition of Cristal	—	83
Other acquisition and divestiture related	4	—
Balance, December 31	$ 166	$ 158

	December 31, 2020	December 31, 2019
Asset retirement obligations were classified as follows:		
Current portion included in “Accrued liabilities”	$ 9	$ 16
Noncurrent portion included in “Asset retirement obligations”	157	142
Asset retirement obligations	$ 166	$ 158

We used the following assumptions in determining asset retirement obligations at December 31, 2020: inflation rates between 1.6% - 4.4% per year; credit adjusted risk-free interest rates between 3.2% -17.7%; the life of mines between 1-26 years and the useful life of assets between 3-33 years.

Environmental Rehabilitation Trust

In accordance with applicable regulations, we have established an environmental rehabilitation trust for the prospecting and mining operations in South Africa, which receives, holds, and invests funds for the rehabilitation or management of asset retirement obligations. The trustees of the fund are appointed by us and consist of sufficiently qualified employees capable of fulfilling their fiduciary duties. At December 31, 2020 and 2019, the environmental rehabilitation trust assets were $12 million and $14 million, respectively, which were recorded in “Other long-term assets” in the Consolidated Balance Sheets.

20. Commitments and Contingencies

Purchase and Capital Commitments —At December 31, 2020, purchase commitments were $194 million for 2021, $84 million for 2022, $62 million for 2023, $56 million for 2024, $44 million for 2025, and $135 million thereafter.

Letters of Credit —At December 31, 2020, we had outstanding letters of credit and bank guarantees of $ 71 million, of which $26 million were letters of credit and $ 45 million were bank guarantees. Amounts for performance bonds were not material.

Environmental Matters — It is our policy to record appropriate liabilities for environmental matters when remedial efforts are probable and the costs can be reasonably estimated. Such liabilities are based on our best estimate of the undiscounted future costs required to complete the remedial work. The recorded liabilities are adjusted periodically as remediation efforts progress or as additional technical, regulatory or legal information becomes available. Given the uncertainties regarding the status of laws, regulations, enforcement policies, the impact of other potentially responsible parties, technology and information related to individual sites, we do not believe it is possible to develop an estimate of the range of reasonably possible environmental loss in excess of our recorded liabilities. We expect to fund expenditures for these matters from operating cash flows. The timing of cash expenditures depends principally on the timing of remedial investigations and feasibility studies, regulatory approval of cleanup projects, remedial techniques to be utilized and agreements with other parties. Included in these environmental matters are the following:

Hawkins Point Plant. Residual waste mud, known as Batch Attack Mud, and a spent sulfuric waste stream were deposited in an onsite repository (the "Batch Attack Lagoon") at a former TiO_2 manufacturing site, Hawkins Point Plant in Baltimore, Maryland, operated by Cristal USA, Inc. from 1954 until 2011. We assumed responsibility for remediation of the Hawkins Point Plant when we acquired the TiO_2 business of Cristal in April 2019. In 1984, a predecessor of Cristal and the Maryland Department of the Environment ("MDE") entered into a consent decree (the "Consent Decree") to address the Batch Attack Lagoon. The Consent Decree required that Cristal close the Batch Attack Lagoon when the Hawkins Point Plant ceased operations. In addition, we are investigating whether hazardous substances are migrating from the Batch Attack Lagoon. A provision of $60 million has been made in our financial statements for the Hawkins Point Plant consistent with the accounting policy described above. We are in discussions with the MDE regarding a new consent decree to address both the Batch Attack Lagoon as well as other environmental contamination issues associated with the Hawkins Point Plant.

Other Matters — We are subject to a number of other lawsuits, investigations and disputes (some of which involve substantial amounts claimed) arising out of the conduct of our business, including matters relating to commercial transactions, prior acquisitions and divestitures, including our acquisition of Cristal, employee benefit plans, intellectual property, and environmental, health and safety matters. We recognize a liability for any contingency that is probable of occurrence and reasonably estimable. We continually assess the likelihood of adverse judgments of outcomes in these matters, as well as potential ranges of possible losses (taking into consideration any insurance recoveries), based on a careful analysis of each matter with the assistance of outside legal counsel and, if applicable, other experts. Included in these other matters is the following:

Venator Materials plc v. Tronox Limited. In May 2019, Venator Materials plc ("Venator") filed an action in the Superior Court of the State of Delaware alleging among other things that we owed Venator a $75 million "Break Fee" pursuant to the terms of a preliminary agreement dated July 14, 2018 (the "Exclusivity Agreement"). The Exclusivity Agreement required, among other things, Tronox and Venator to use their respective best efforts to negotiate a definitive agreement to sell the entirety of the National Titanium Dioxide Company Limited's ("Cristal's") North American operations to Venator if a divestiture of all or a substantial part of these operations were required to secure the approval of the Federal Trade Commission for us to complete our acquisition of Cristal's TiO_2 business. In June 2019, we denied Venator's claims and counterclaimed against Venator seeking to recover $400 million in damages from Venator that we suffered as a result of Venator's breaches of the Exclusivity Agreement. Specifically, we alleged, among other things, that Venator's failure to use best efforts constituted a material breach of the Exclusivity Agreement and directly resulted in and caused us to sell Cristal's North American operations to an alternative buyer for $701 million, $400 million less than the price Venator had agreed to in the Exclusivity Agreement. Though we believe that our interpretation of the Exclusivity Agreement is correct, there can be no assurance that we will prevail in litigation.

21. Accumulated Other Comprehensive Income (Loss) Attributable to Tronox Holdings plc and Other Equity Items

The tables below present changes in accumulated other comprehensive income (loss) by component for 2020, 2019 and 2018.

	Cumulative Translation Adjustment	Pension Liability Adjustment	Unrealized Gains (losses) on Derivatives	Total
Balance, January 1, 2018	$ (312)	$ (90)	$ (1)	$ (403)
Other comprehensive income (loss)	(133)	(5)	1	(137)
Amounts reclassified from accumulated other comprehensive income (loss)	—	—	—	—
Balance, December 31, 2018	(445)	(95)	—	(540)
Other comprehensive income (loss)	3	(11)	8	—
Acquisition of noncontrolling interest	(61)	—	—	(61)
Amounts reclassified from accumulated other comprehensive income (loss)	—	2	(7)	(5)
Balance, December 31, 2019	$ (503)	$ (104)	$ 1	$ (606)
Other comprehensive income (loss)	12	(20)	(4)	(12)
Amounts reclassified from accumulated other comprehensive income (loss)	—	4	4	8
Balance, December 31, 2020	$ (491)	$ (120)	$ 1	$ (610)

Repurchase of Common Stock

In addition to the repurchase of 14 million shares from Exxaro discussed in Note 24, “Related Parties”, on June 3, 2019, the Company’s Board of Directors authorized the repurchase of up to $100 million of the Company’s stock. During the year ended December 31, 2019, we purchased 7,453,391 shares under the authorization at an average price of $ 11.59 per share and at a cost of approximately $87 million, including sales commissions and fees. We did not complete the full program given certain Section 382 restrictions related to our NOLs. Upon repurchase of the shares by the Company, the shares were cancelled.

22. Share-based Compensation

Share-based compensation expense consisted of the following:

	Year Ended December 31,		
	2020	2019	2018
Restricted shares and restricted share units	$ 30	$ 32	$ 21
Options	—	—	—
Total share-based compensation expense (continuing operations)	$ 30	$ 32	$ 21

The stock compensation expense for the year ended December 31, 2020 is inclusive of a $ 4 million credit for the reversal of expense due to the 2018 performance grants.

Tronox Holdings plc Amended and Restated Management Equity Incentive Plan

On March 27, 2019, in connection with the Re-domicile Transaction, Tronox Holdings plc assumed the management equity incentive plan previously adopted by Tronox Limited, which plan was renamed the Tronox Holdings plc Amended and Restated Management Equity Incentive Plan. The amendments to the plan were made to provide, among other things, for the appropriate substitution of Tronox Holdings in place of Tronox Limited and to ensure the compliance with the laws of England and Wales law in place of Australian law. The MEIP permits the grant of awards that are comprised of incentive options, nonqualified options, share appreciation rights, restricted shares, restricted share units, performance awards, and other share-based awards, cash payments, and other forms as the compensation committee of the Board of Directors (the “Board”) in its discretion deems appropriate, including any combination of the above. The maximum number of shares which were initially subjected to awards (inclusive of incentive options) was 20,781,225 ordinary shares and was increased by 8,000,000 on the affirmative vote of our shareholders on June 24, 2020.

Restricted Shares

We did not grant any restricted shares during 2020 or 2019. Restricted shares issued under the MEIP contain non-forfeitable dividend rights. During the prior year, the restricted shares became fully vested. The total fair value of restricted shares that vested during both 2019 and 2018 was less than $1 million.

Restricted Share Units (“RSUs”)

During 2017, a total of 1,397,471 RSUs were granted, pursuant to an Integration Incentive Award program (“Integration Incentive Award”) established in connection with the Cristal Transaction, to certain executive officers and managers with significant integration accountability. In addition, during the second quarter of 2018, an additional 139,225 RSUs were granted under the Integration Incentive Award. These RSUs would have vested two years from the date of the close of the Cristal Transaction and the number of shares that would have been issued to grantees would have been based upon the achievement of established performance conditions. Under the original terms of the Integration Incentive Award, if the Cristal Transaction did not close by July 1, 2018, all unvested awards pursuant to the Integration Incentive Award would immediately be canceled and forfeited.

During the second quarter of 2018, terms of the Integration Incentive Award were modified to eliminate the requirement that the Cristal Transaction must close by July 1, 2018. We accounted for this modification as a Type III modification since, at the modification date, the expectation of the award vesting changed from improbable to probable. As a result, we reversed approximately $6 million of previously recorded expense related to the Integration Incentive Award. The issued and unvested RSUs under the Integration Incentive Award were revalued based on the closing price of the Company’s stock on the modification date and will vest two years from the date the Cristal Transaction closed and based upon the achievement of established performance conditions. As a result, the estimated expense associated with the revalued award is being expensed over the period from the modification date through two years from the date that the Cristal Transaction closed.

During the third and fourth quarter of 2018, an additional 90,161 and 40,161 RSUs, respectively, were granted under the modified terms of the Integration Incentive Award, and during the third and fourth quarter of 2019, 65,387 and 16,750 additional RSUs were granted, respectively. All the integration awards discussed above will vest on April 10, 2021 if performance conditions are met.

In addition to the Integration Incentive Award, during 2020, we granted RSUs which have time and/or performance conditions. Both the time-based awards and the performance-based awards are classified as equity awards.

2020 Grant - The Company granted both time-based and performance-based awards to certain members of management and to members of the Board. A total of 1,784,377 of time-based awards were granted to management which will vest ratably over a three-year period ending March 5, 2023. A total of 193,805 of time-based awards were granted to members of the Board of which 21,654 vested in June 2020, 161,720 will vest in May 2021 and 10,431 will vest in June 2021. A total of 1,533,008 of performance-based awards were granted, of which 766,504 of the awards vest based on a relative Total Shareholder Return ("TSR") calculation and 766,504 of the awards vest based on certain performance metrics of the Company. The non-TSR performance-based awards vest on March 5, 2023 based on the achievement against the target average company performance of three separate performance periods, commencing on January 1 of each 2020, 2021, and 2022 and ending on December 31 of each 2020, 2021 and 2022, for which, for each performance period, the performance metric is an average annual operating return on net assets (ORONA). Similar to the Company's historical TSR awards granted in prior years, the TSR awards vest based on the Company's three-year TSR versus the peer group performance levels. Given these terms, the TSR metric is considered a market condition for which we used a Monte Carlo simulation to determine the weighted average grant date fair value of $10.00.

Similar TSR awards were granted during 2019 and 2018 with grant date fair values of $ 12.65 and $20.80, respectively, which were calculated utilizing a Monte Carlo simulation. The following weighted-average assumptions were utilized to value the grants in 2020, 2019 and 2018:

	2020	2019	2018
Dividend yield	2.13 %	N/A	N/A
Expected historical volatility	58.30 %	67.20 %	80.40 %
Risk free interest rate	1.42 %	2.50 %	2.32 %
Expected life (in years)	3	3	3

The following table presents a summary of activity for RSUs for 2020:

	Number of Shares	Weighted Average Grant Date Fair Value
Outstanding, January 1, 2020	5,557,659	$ 15.19
Granted	3,982,816	8.89
Vested	(2,033,591)	14.56
Forfeited	(202,979)	11.75
Outstanding, December 31, 2020	7,303,905	$ 12.39
Expected to vest, December 31, 2020	6,805,041	$ 12.21

The 2017 performance-based RSUs vested above target in 2020 and resulted in 471,626 additional RSU shares being granted and vested immediately. At December 31, 2020, there was $32 million of unrecognized compensation expense related to nonvested RSUs, adjusted for estimated forfeitures, which is expected to be recognized over a weighted-average period of 1.7 years. The weighted-average grant-date fair value of RSUs granted during 2020, 2019 and 2018 was $8.89 per unit, $10.81 per unit, and $19.23 per unit, respectively. The total fair value of RSUs that vested during 2020, 2019 and 2018 was $ 30 million, $20 million and $17 million, respectively.

Options

The fair value of options granted is determined on the grant date using the Black-Scholes option-pricing model and is recognized in earnings on a straight-line basis over the employee service period of three years, which is the vesting period. The assumptions used in the Black-Scholes option-pricing model on the grant date are based on (i) a fair value using the closing price of our Ordinary Shares on the grant date, (ii) a risk-free interest rate based on U.S. Treasury Strips available with a maturity period consistent with the expected life assumption, (iii) an expected volatility assumption based on historical price movements of our peer group, and (iv) a dividend yield determined based on the Company's expected dividend payouts. We did not issue any options during 2020 and 2019 and all our options outstanding are fully vested at December 31, 2020.

The following table presents a summary of option activity for 2020:

	Number of Options	Weighted Average Exercise Price	Weighted Average Contractual Life (years)	Intrinsic Value
Outstanding, January 1, 2020	1,260,902	$ 21.54	3.18	$ —
Exercised	—	—		
Forfeited	—	—		
Expired	(59,011)	20.22		
Outstanding and Exercisable, December 31, 2020	1,201,891	$ 21.60	2.19	$ —

The aggregate intrinsic values in the table represent the total pre-tax intrinsic value (the difference between our share price at the indicated dates and the options' exercise price, multiplied by the number of in-the-money options) that would have been received by the option holders had all option holders exercised their in-the-money options at the end of the year. The amount will change based on the fair market value of our stock. There were no options exercised during both 2020 and 2019 and consequently there was no related intrinsic value. Total intrinsic value of options exercised during 2018 was less than $1 million. We issue new shares upon the exercise of options. During 2018, we received $4 million, in cash for the exercise of stock options. At both December 31, 2020 and 2019, there was no unrecognized compensation expense related to options.

23. Pension and Other Postretirement Healthcare Benefits

The following provides information regarding our U.S. and foreign plans:

U.S. Plans

Pension Plans — Tronox has one main U.S. defined benefit plan: the U.S. Qualified Plan. Prior to December 2020, the Company also had the U.S. Pension Plan (which was acquired as part of the Cristal acquisition). In December 2020, the U.S. Pension Plan was frozen and merged into the U.S. Qualified Plan. The U.S. Qualified Plan is a funded noncontributory qualified benefit plan which is in accordance with the Employee Retirement Income Security Act of 1974 (“ERISA”) and the Internal Revenue Code. We made contributions into funds managed by a third party, and those funds are held exclusively for the benefit of the plan participants. Benefits under the U.S. Qualified Plan were generally calculated based on years of service and final average pay. The U.S. Qualified Plan was frozen and closed to new participants on June 1, 2009.

Postretirement Healthcare Plans — We maintain a U.S. retiree welfare plan. Additionally, in prior periods, we also maintained a U.S. postretirement healthcare plan which we settled in 2015 which resulted in a settlement gain of $3 million which had been deferred to “Accumulated other comprehensive loss” in the Consolidated Balance Sheet as settlement accounting requirements were deemed not fully satisfied. During 2018, we released the $3 million from “Accumulated other comprehensive loss” and recorded such amount in “Other income (expense), net” in the Consolidated Statement of Operations.

International Plans

Pension Plans — Tronox has international defined benefit commitments primarily in the United Kingdom ("U.K. DB Scheme") and Saudi Arabia. The U.K. DB Scheme is a funded qualified defined benefit plan in the United Kingdom, which is frozen with no additional benefits accruing to the participants. Benefits under the U.K. DB Scheme are generally calculated based on years of credit service and final compensation when benefits ceased to accrue as defined under the plan provisions. We also maintain a Saudi Arabia Cristal End of Service Benefit plan which provides end of service benefits to qualifying participants. End of service benefits are based on years of service and the reasons for which a participant's services to the Company are terminated.

Multiemployer Pension Plan - In prior periods, we maintained a defined benefit plan in the Netherlands (the “Netherlands Plan”) to provide defined pension benefits to qualifying employees of Tronox Pigments (Holland) B.V. and its related companies. During 2014, the Netherlands Plan was replaced with a multiemployer plan, the Netherlands Contribution Plan (the "CDC Plan") effective January 1, 2015. Under the CDC Plan, employees earn benefits based on their pensionable salaries each year determined using a career average benefit formula. The collective bargaining agreement between us and the participants require us to contribute 21.2% of the participants’ pensionable salaries into a pooled fund administered by the industry-wide PGB. The pensionable salary is the annual income of employees subject to a cap, which is adjusted each year to reflect the current requirements of the Netherlands’ Wages and Salaries Tax Act of 1964. Our obligation under this plan is limited to the fixed percentage contribution we make each year. The employees are entitled to any returns generated from the investment activities of the fund.

The following table outlines the details of our participation in the CDC Plan for the year ended December 31, 2020. The CDC disclosures provided herein are based on the fund’s 2019 annual report, which is the most recently available public information. Based on the total plan assets and accumulated benefit obligation information in the plan’s annual report, the zone status was green as of December 31, 2019. A green zone status indicates that the plan was at least 80 percent funded. The “FIP/RP Status Pending/Implemented” column indicates whether a financial improvement plan (FIP) or a rehabilitation plan (RP) is either pending or has been implemented. As of December 31, 2020, we are not aware of any financial improvement or rehabilitation plan being implemented or pending. The last column lists the expiration date of the collective-bargaining agreement to which the plan is subject.

		Pension Protection Act Zone Status			Tronox Contributions			
Pension Fund	EIN/Pension Plan Number	2020	2019	FIP/RP Pending/ Implemented	2020	2019	Surcharge Imposed	Expiration date of Collective-Bargaining Agreement
PGB	NA	N/A	Green	No	$ 5	$ 4	No	12/31/2024

On the basis of the information available in the CDC Plan 2019 annual report, our contribution does not constitute more than 5 percent of the total contribution to the plan by all participants. During 2020, the fund did not impose any surcharge on us.

Postretirement Healthcare Plans — We also maintain postretirement healthcare plans in South Africa (the "South African Plan") and Brazil (the "Brazil Medical Plan"). The South African Plan provides medical and dental benefits to certain South African employees, retired employees and their registered dependents. The South African Plan provides benefits as follows: (i) members employed before March 1, 1994 receive 100% post-retirement and death-in-service benefits; (ii) members employed on or after March 1, 1994 but before January 1, 2002 receive 2% per year of completed service subject to a maximum of 50% post-retirement and death-in-service benefits; and, (iii) members employed on or after January 1, 2002 receive no post-retirement and death-in-service benefits. The Brazil Medical Plan provides post-employment medical benefits to employees who contributed to the medical plan while employed. Retirees receiving a benefit under the plan are required to pay a contribution that varies based on the coverage level elected.

Pension and Postretirement Benefit Costs / Obligations

Benefit Obligations and Funded Status — The following provides a reconciliation of beginning and ending benefit obligations, beginning and ending plan assets, funded status, and balance sheet classification of our U.S. and international pension plans and other post-retirement benefit plans ("OPEB") as of and for the years ended December 31, 2020 and 2019. The benefit obligations and plan assets associated with our principal benefit plans are measured on December 31.

	Pensions				Other Post Retirement Benefit Plans			
	December 31				December 31			
	2020		2019		2020		2019	
	US	International	US	International	US	International	US	International
Change in benefit obligations:								
Benefit obligation, beginning of year	$ 398	$ 232	$ 329	$ —	$ 2	$ 13	$ —	$ 7
Service cost	1	4	1	3	—	—	—	—
Interest cost	12	5	16	4	—	1	—	1
Net actuarial (gains) losses	28	20	36	6	—	3	—	2
Acquisition, net[1]	—	—	106	230	—	—	2	3
Curtailments	(2)	—	—	—	—	(1)	—	—
Settlements	(7)	(6)	(59)	(3)	—	—	—	—
Plan amendments[2]	—	—	—	—	—	9	—	—
Foreign currency rate changes	—	6	—	2	—	(2)	—	—
Benefits paid	(31)	(9)	(31)	(10)	—	—	—	—
Benefit obligation, end of year [3]	399	252	398	232	2	23	2	13
Change in plan assets:								
Fair value of plan assets, beginning of year	319	186	243	—	—	—	—	—
Actual return on plan assets	41	15	51	6	—	—	—	—
Acquisition, net[1]	—	—	105	184	—	—	—	—
Employer contributions	22	3	10	7	—	—	—	—
Benefits paid	(31)	(9)	(31)	(10)	—	—	—	—
Foreign currency rate changes	—	6	—	2	—	—	—	—
Settlements	(7)	(6)	(59)	(3)	—	—	—	—
Fair value of plan assets, end of year	344	195	319	186	—	—	—	—
Net underfunded status of plans	$ (55)	$ (57)	$ (79)	$ (46)	$ (2)	$ (23)	$ (2)	$ (13)
Classification of amounts recognized in the Consolidated Balance Sheets:								
Other long-term assets	$ —	$ 14	$ 6	$ 20	$ —	$ —	$ —	$ —
Accrued liabilities	—	(5)	—	(6)	—	—	—	—
Pension and postretirement healthcare benefits	(55)	(66)	(85)	(60)	(2)	(23)	(2)	(13)
Total liabilities	(55)	(71)	(85)	(66)	(2)	(23)	(2)	(13)
Accumulated other comprehensive (income) loss	98	12	96	4	—	12	—	1
Total	$ 43	$ (45)	$ 17	$ (42)	$ (2)	$ (11)	$ (2)	$ (12)

(1) Represents the assets and benefit obligations assumed as part of the Cristal Transaction in 2019. Such plan assets and benefit obligations were remeasured as of the merger date and all subsequent activity through December 31, 2019 is presented within the respective captions above.

(2) Relates to a plan amendment entered into during 2020 related to the Brazil Medical Plan.

(3) Since the benefits under the U.S Qualified Plan and the U.K. DB Scheme are frozen, the projected benefit obligation and accumulated benefit obligation are the same.

Contributions

At a minimum, Tronox contributes to its pension plans to comply with local regulatory requirements (e.g., ERISA in the United States). Discretionary contributions in excess of the local minimum requirements are made based on many factors, including long-term projections of the plans' funded status, the economic environment, potential risk of overfunding, pension insurance costs and alternative uses of the cash. Changes to these factors can impact the timing of discretionary contributions from year to year. Pension contributions were $17 million in 2020, net of $4 million received from the winding up of our Australian plan and estimated required contributions for 2021 are currently expected to be approximately $2 million.

The following table provides information for pension plans where the accumulated benefit obligation exceeds the fair value of the plan assets:

	Pensions	
	2020	
	US	International
Projected benefit obligation (PBO)	$ 399	$ 71
Accumulated benefit obligation (ABO)	$ 399	$ 46
Fair value of plan assets	$ 344	$ —

Expected Benefit Payments — The following table shows the expected cash benefit payments for the next five years and in the aggregate for the years 2026 through 2030:

	2021	2022	2023	2024	2025	2026-2030
Pensions - US	$ 31	$ 31	$ 28	$ 27	$ 27	$ 119
Pensions - International	$ 12	$ 9	$ 11	$ 11	$ 12	$ 63
Other Post Retirement Benefit Plans - US	$ —	$ —	$ —	$ —	$ —	$ 1
Other Post Retirement Benefit Plans - International	$ —	$ —	$ 1	$ 1	$ 1	$ 8

Retirement and Postretirement Healthcare Expense — The table below presents the components of net periodic cost associated with the U.S. and foreign plans recognized in the Consolidated Statements of Operations for 2020, 2019, and 2018:

	Pensions			Other Postretirement Benefit Plans		
	Year Ended December 31,			Year Ended December 31,		
	2020	2019	2018	2020	2019	2018
Net periodic cost:						
Service cost	$ 5	$ 4	$ —	$ —	$ —	$ —
Interest cost [(1)]	17	21	13	1	1	1
Expected return on plan assets [(1)]	(22)	(22)	(15)	—	—	—
Net amortization of actuarial loss [(1)]	4	2	3	—	—	—
Settlement losses (gains) [(1)]	—	(1)	—	—	—	(3)
Curtailment (gains) [(1)]	(2)	—	—	—	—	—
Total net periodic cost - continuing operations	$ 2	$ 4	$ 1	$ 1	$ 1	$ (2)

(1) Recorded in Other income (expense), net in the Consolidated Statement of Operations.

Assumptions —

The following weighted average assumptions were used to determine net periodic cost:

	Pension				
	2020		2019		2018
	US	International	US	International	US
Discount rate	3.39 %	1.98 %	4.34 %	2.50 %	3.71 %
Expected return on plan assets	6.03 %	2.50 %	5.69 %	3.00 %	5.64 %

	OPEB				
	2020		2019		2018
	US	International	US	International	International
Discount rate	3.36 %	8.72 %	4.00 %	10.25 %	11.54 %
Expected return on plan assets	N/A	N/A	N/A	N/A	N/A

The following weighted average assumptions were used in estimating the actuarial present value of benefit obligations:

	Pensions				
	2020		2019		2018
	US	International	US	International	US
Discount rate	2.60 %	1.45 %	3.39 %	1.98 %	4.40 %
Rate of compensation increase	3.00 %	4.65 %	3.00 %	4.67 %	N/A

	OPEB				
	2020		2019		2018
	US	International	US	International	International
Discount rate	2.59 %	9.51 %	3.36 %	9.91 %	11.38 %
Rate of compensation increase	N/A	N/A	N/A	N/A	N/A

For the U.S. Qualified Plan and the U.S. Pension Plan, the mortality assumption was updated on December 31, 2020 to use the Society of Actuaries' most recently published generational projection scale (i.e. MP-2020) and base table (i.e. Pri-2012). The mortality improvement scale that had been used as of December 31, 2019 was the MP-2019 projection scale and the base table was Pri-2012.

Expected Return on Plan Assets — In forming the assumption of the U.S. and international long-term rate of return on plan assets, we considered the expected earnings on funds already invested, earnings on contributions expected to be received in the current year, and earnings on reinvested returns. The long-term rate of return estimation methodology for the Company's pension plans is based on a capital asset pricing model using historical data and a forecasted earnings model. An expected return on plan assets analysis is performed which incorporates the current portfolio allocation, historical asset-class returns, and an assessment of expected future performance using asset-class risk factors.

Discount Rate — The 2020 and 2019 rates were selected based on the results of a cash flow matching analysis, which projected the expected cash flows of the plans using a yield curves model developed from a universe of Aa-graded U.S. currency corporate bonds (obtained from Bloomberg) with BVAL scores of 6 or greater. The 2018 rates were similarly selected with the exception of the use of BVAL scores as a selection criteria. Bonds with features that imply unreliable pricing, a less than certain cash flow, or other indicators of optionality are filtered out of the universe. The remaining universe is categorized into maturity groups, and within each of the maturity groups yields are ranked into percentiles.

Plan Assets — The investments of the U.S. and International pension plans are managed to meet the future expected benefit liabilities of the plan over the long term by investing in diversified portfolios consistent with prudent diversification and historical and expected capital market returns. Tronox's U.S. and international pension plans' weighted-average asset allocations at December 31, 2020 and 2019, and the target asset allocation ranges, by major asset category, are as follows:

	December 31,							
	2020				2019			
	US		International		US		International	
	Actual	Target	Actual	Target	Actual	Target	Actual	Target
Equity securities	43 %	42 %	— %	— %	50 %	49 %	7 %	4 %
Debt securities	39	40	39	30	48	48	26	25
Real estate	1	—	—	—	1	—	—	—
Other	17	18	61	70	1	3	67	71
Total	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %

The fair values of pension investments as of December 31, 2020 are summarized below:

	Fair Value Measurement at December 31, 2020 Using:						
	Quoted Prices in Active Markets for Identical Assets (Level 1)		Significant Other Observable Inputs (Level 2)		Significant Unobservable Inputs (Level 3)		Total
Asset category:							
Equities securities:							
Global equity securities	$ 83	(1)	$ —		$ —		$ 83
Global comingled equity funds	66	(2)	—		—		66
Debt securities:							
US government bonds	70	(3)	—		—		70
Foreign government bonds	37	(3)	—		—		37
US corporate bonds	—		62	(4)	—		62
Foreign corporate bonds	—		43	(4)	—		43
Real Estate:							
Property/ real estate fund	—		1	(5)	—		1
Other:							
Insurance contracts	—		—		111	(7)	111
Cash & cash equivalents	66	(6)	—		—		66
Total at fair value	$ 322		$ 106		$ 111		$ 539

(1) For global equity securities, this category is comprised of shares of common stock in both U.S. and international companies from a diverse set of industries and size. Common stock is valuated at the closing market price reported on a U.S. or international exchange where the security is actively traded. Equity securities are classified within level 1 of the fair value hierarchy.

(2) Global commingled equity funds are comprised of managed funds that invest in common stock of both U.S. and international companies shares from a diverse set of industries and size. Common stock are valued at the closing market price reported on a U.S. or international exchange where the security is actively traded. These funds are classified within level 1 of the fair value hierarchy.

(3) For US and foreign government bonds, this category includes U.S. treasuries, U.S. federal agency obligations and international government debt. The fair value of these investments are based on observable quoted prices on active exchanges, which are level 1 inputs.

(4) For US corporate bonds and foreign corporate bonds, this category is comprised of corporate bonds of U.S. and foreign companies from a diverse set of industries and size. The fair values for the U.S. and foreign corporate bonds are determined using quoted prices of similar securities in active markets and observable data or broker or dealer quotations. The fair values for these investments are classified as level 2 within the valuation hierarchy.

(5) For property / real estate funds, this category includes real estate properties, partnership equities and investments in operating companies. The fair value of the assets is determined using discounted cash flows by estimating an income stream for the property plus a reversion into a present value at a risk adjusted

rate. Yield rates and growth assumptions utilized are derived from market transactions as well as other financial and industry data. The fair value of these investments are classified as level 2 in the valuation hierarchy.

(6) Cash and cash equivalents include cash and short-interest bearing investments with maturities of three months or less. Investments are valued at cost plus accrued interest. Cash and cash equivalents are classified within level 1 of the valuation hierarchy.

(7) For insurance contracts, the fair value is estimated as the cost of purchasing equivalent annuities on terms consistent with those currently available in the market. The contracts are with highly rated insurance companies and are classified within level 3 of the valuation hierarchy. The following table summarizes changes in fair value of the pension plan assets classified as level 3 for the year ended December 31, 2020:

	Insurance Contracts
Balance, December 31, 2019	$ 104
Actual return on plan assets	9
Purchases, sales, settlements	(5)
Transfers in/out of Level 3	—
Foreign currency translation	3
Balance, December 31, 2020	$ 111

The fair values of pension investments as of December 31, 2019 are summarized below:

	Fair Value Measurement at December 31, 2019, Using:			
	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Total
Asset category:				
Equities securities:				
Global equity securities	$ 68 (1)	$ —	$ —	$ 68
Global comingled equity funds	104 (2)	—	—	104
Debt securities:				
US government bonds	69 (3)	— (3)	—	69
Foreign government bonds	34 (3)	—	—	34
US corporate bonds	—	79	—	79
Foreign corporate bonds	16 (5)	6	—	22
Real Estate:				
Property/ real estate fund	—	1 (6)	—	1
Other:				
Insurance contracts	—	—	104 (9)	104
Alternative investments	—	1 (7)	—	1
Cash & cash equivalents	23 (8)	—	—	23
Total at fair value	$ 314	$ 87	$ 104	$ 505

(1) For global equity securities, this category is comprised of shares of common stock in both U.S. and international companies from a diverse set of industries and size. Common stock is valuated at the closing market price reported on a U.S. or international exchange where the security is actively traded. Equity securities are classified within level 1 of the fair value hierarchy.

(2) Global commingled equity funds are comprised of managed funds that invest in common stock of both U.S. and international companies shares from a diverse set of industries and size. Common stock are valued at the closing market price reported on a U.S. or international exchange where the security is actively traded. These funds are classified within level 1 of the fair value hierarchy.

(3) For US and foreign government bonds, this category includes U.S. treasuries, U.S. federal agency obligations and international government debt. The fair value of these investments are based on observable quoted prices on active exchanges, which are level 1 inputs.

(4) For US corporate bonds and a portion of foreign corporate bonds, this category is comprised of corporate bonds of U.S. and foreign companies from a diverse set of industries and size. The fair values for the U.S. and foreign corporate bonds are determined using quoted prices of similar securities in active markets and observable data or broker or dealer quotations. The fair values for these investments are classified as level 2 within the valuation hierarchy.

(5) For certain foreign corporate bonds, the category is comprised of corporate bonds of foreign companies from a diverse set of industries and size. The fair value is based on observable quoted prices on active exchanges, which are level 1 inputs.

(6) For property / real estate funds, this category includes real estate properties, partnership equities and investments in operating companies. The fair value of the assets is determined using discounted cash flows by estimating an income stream for the property plus a reversion into a present value at a risk adjusted rate. Yield rates and growth assumptions utilized are derived from market transactions as well as other financial and industry data. The fair value of these investments are classified as level 2 in the valuation hierarchy.

(7) For alternative investments, this category is comprised of investments in alternative mutual funds whose holdings include liquid securities, cash and derivatives. Such funds focus on diversification and employ a variety of investing strategies including long/short equity, multi-strategy, and global macro. The fair value of these investments is determined by reference to the net asset value of the underlying holdings of the fund, which can be determined using observable data (e.g. indices, yield curves, quoted prices of similar securities), and is classified within level 2 of the valuation hierarchy.

(8) Cash and cash equivalents include cash and short-interest bearing investments with maturities of three months or less. Investments are valued at cost plus accrued interest. Cash and cash equivalents are classified within level 1 of the valuation hierarchy.

(9) For insurance contracts, the fair value is estimated as the cost of purchasing equivalent annuities on terms consistent with those currently available in the market. The contracts are with highly rated insurance companies and are classified within level 3 of the valuation hierarchy. The following table summarizes changes in fair value of the pension plan assets classified as level 3 for the year ended December 31, 2019:

	Insurance Contracts
Balance, December 31, 2018	$ —
Actual return on plan assets	2
Acquisitions	101
Transfers in/out of Level 3	—
Foreign currency translation	1
Balance, December 31, 2019	$ 104

Defined Contribution Plans

U.S. Savings Investment Plan

In 2006, we established the U.S. Savings Investment Plan (the “SIP”), a qualified defined contribution plan under Section 401(k) of the Internal Revenue Code. Under the SIP, our regular full-time and part-time employees contribute a portion of their earnings, and we match these contributions up to a predefined threshold. Our matching contribution is 100% of the first 6% of employee contributions. Effective January 1, 2013, we established a profit sharing contribution at 6% of employees’ pay (“discretionary contribution”). The discretionary contribution is subject to our Board of Directors’ approval each year. The Board approved discretionary contribution of 6% of pay for 2020, 2019 and 2018. Our matching contribution to the SIP vests immediately; however, our discretionary contribution is subject to vesting conditions that must be satisfied over a three-year vesting period. Contributions under the SIP, including our match, are invested in accordance with the investment options elected by plan participants. Compensation expenses associated with our matching contribution to the SIP was $4 million, $4 million and $4 million during 2020, 2019 and 2018, respectively, which was included in “Selling, general and administrative expenses” in the Consolidated Statements of Operations. Compensation expense associated with our discretionary contribution was $4 million in 2020, $4 million in 2019 and $5 million in 2018, which was included in “Selling, general and administrative expenses” in the Consolidated Statements of Operations.

U.S. Benefit Restoration Plan

In 2006, we established the U.S. Benefit Restoration Plan (the “BRP”), a nonqualified defined contribution plan, for employees whose eligible compensation is expected to exceed the IRS compensation limits for qualified plans. Under the BRP, participants can contribute up to 20% of their annual compensation and incentive. Our matching contribution under the BRP is the same as the SIP. Our matching contribution under this plan vests immediately to plan participants. Contributions under the BRP, including our match, are invested in accordance with the investment options elected by plan participants. Compensation expense associated with our matching contribution to the BRP was $1 million, $2 million and $1 million during 2020, 2019 and 2018 which was included in “Selling, general and administrative expenses” in the Consolidated Statements of Operations.

24. Related Party Transactions

Exxaro

At December 31, 2020, Exxaro continues to own approximately 14.7 million shares of Tronox, or a 10.3% ownership interest, as well as their 26% ownership interest in our South African operating subsidiaries.

We had service level agreements with Exxaro for research and development that expired during the third quarter of 2018 . Such service level agreements amounted to expenses of $1 million during 2018 which was included in “Selling general and administrative expense” in the Consolidated Statements of Operations.

On November 26, 2018, we, certain of our subsidiaries and Exxaro entered into the Completion Agreement. The Completion Agreement provides for the orderly sale of Exxaro’s remaining ownership interest in us, subject to market conditions, helped to facilitate the re-domicile transaction, as well as addressed several legacy issues related to our 2012 acquisition of Exxaro’s mineral sands business.

Pursuant to the terms of the Completion Agreement, on May 9, 2019, Exxaro exercised their right under the agreement to sell 14 million shares to us for an aggregate purchase price of approximately $200 million or $14.3185 per share, plus fees of approximately $1 million. The share price was based upon a 5% discount to the 10 day volume weighted average price as of the day that Exxaro exercised their sale notice to us. Upon repurchase of the shares by the Company, the shares were cancelled. As a result of the sale of the 14 million shares on May 9, 2019, we recorded a liability of approximately $4 million which is included in “Accrued liabilities” in our Consolidated Balance Sheets as of December 31, 2019 and which was subsequently paid in January 2020.

Furthermore, pursuant to the Completion Agreement, the parties agreed to accelerate our purchase of Exxaro's 26% membership interest in Tronox Sands LLP, a U.K. limited liability partnership ("Tronox Sands"). On February 15, 2019, we completed the redemption of Exxaro's ownership interest in Tronox Sands for consideration of approximately ZAR 2.06 billion (or approximately $148 million in cash), which represented Exxaro's indirect share of the loan accounts in our South African subsidiaries.

Tasnee/Cristal

On April 10, 2019, we announced the completion of the acquisition of the TiO_2 business of Cristal for $1.675 billion of cash, subject to a working capital and noncurrent liability adjustment, plus 37,580,000 ordinary shares. At December 31, 2020, Cristal International Holdings B.V. (formerly known as Cristal Inorganic Chemical Netherlands Cooperatief W.A.), a wholly-owned subsidiary of Tasnee, continues to own 37,580,000 shares of Tronox, or a 26% ownership interest. In February 2020, Tronox and Cristal resolved the working capital and noncurrent liability adjustment by agreeing that no payment was required by either party.

On May 9, 2018, we entered into an Option Agreement with AMIC which is owned equally by Tasnee and Cristal. Under the terms of the Option Agreement, AMIC granted us an option (the “Option”) to acquire 90% of a special purpose vehicle (the “SPV”) which will hold AMIC’s ownership in a titanium slag smelter facility (the “Slagger”) located in The Jazan City for Primary and Downstream Industries in KSA.

The Option may be exercised if the Slagger achieves certain production criteria related to sustained quality and tonnage of slag produced (the “Option Criteria”). Likewise, AMIC may require us to acquire the Slagger on the same terms if the Option Criteria are satisfied (the "Put"). If the Option Criteria are met and Cristal exercises the Put or we exercise the Option, AMIC will also contribute $322 million of AMIC indebtedness (the "AMIC Debt") to the SPV before we acquire a 90% ownership in it. In addition, pursuant to the Option Agreement, we agreed to lend AMIC up to $125 million for capital expenditures and operational expenses intended to facilitate the start-up of the Slagger (the “Tronox Loans”). Such funds were drawn down by AMIC and the SPV, as applicable, on a quarterly basis as needed based on a budget reflecting the needs of the Slagger start-up. For the three months and year ended December 31, 2020, we have loaned an additional $12 million and $36 million, respectively, for capital expenditures and operational expenses to facilitate the startup of the Slagger. This brings the total amount that we have lent under the Tronox Loans to equal to the $125 million maximum amount that we agreed to lend. At December 31, 2020 and December 31, 2019, we have recorded $125 million and $89 million respectively for capital expenditures and operational expenses to facilitate the start-up of the Slagger and we have recorded this loan and related interest of $6 million and $3 million respectively within “Other long-term assets". The Option did not have a significant impact on the financial statements as of or for the periods ended December 31, 2020. If the Option Criteria are met and Cristal exercises the Put or we exercise the Option, AMIC will also contribute the Tronox Loans to the SPV before we acquire a 90% ownership in it.

On May 13, 2020, we amended the Option Agreement (the "First Amendment") with AMIC to address circumstances in which the Option Criteria cannot be satisfied. Pursuant to the First Amendment, if the Option Criteria are not satisfied, Tronox has the right but not the obligation to acquire the SPV in exchange for its forgiveness of the Tronox Loan, in which case the AMIC Debt will be retained by AMIC and not contributed to the SPV. The First Amendment did not have a significant impact on our financial statements as of or for the period ended December 31, 2020.

Additionally, on May 13, 2020, we amended a Technical Services Agreement that we had entered with AMIC on March 15, 2018, to add project management support services. Under this arrangement, AMIC and its consultants are still responsible for engineering and construction of the Slagger while we provide technical advice and project management services including supervision and management of third party consultants intended to satisfy the Option Criteria. As compensation for these services, Tronox receives a monthly management fee of approximately $1 million, which is recorded in “Other income (expense), net” within the Consolidated Statement of Operations and in “Prepaid and other assets” on the Consolidated Balance Sheet. The monthly management fee is subject to certain success incentives if and when the Slagger achieves the Option Criteria. Tronox recorded approximately $2 million and $5 million in "Other Income" for both the three months and year ended December 31, 2020, respectively, in the Consolidated Statement of Operations. At December 31, 2020, Tronox had a receivable due from AMIC related to management fee of $1 million that is recorded within “Prepaid and other assets”.

In conjunction with the acquisition on April 10, 2019, we entered into a transition services agreement with Tasnee, Cristal and AMIC. Under the terms of the transition services agreement, Tasnee and its affiliates will provide services to Tronox related to information technology support and infrastructure, logistics, safety, health and environmental, treasury and tax. Similarly, Tronox will provide services to Tasnee and its affiliates for information technology support and infrastructure, finance and accounting, tax, treasury, human resources, logistics, research and development and business development. As part of the transition services agreement, Tronox recorded approximately $1 million as a reduction to "cost of goods sold" on the Consolidated Statement of Operations for the year ended December 31, 2020. In addition, as part of the transition services agreement, Tronox recorded approximately $2 million and $4 million as reduction of "Selling, general and administrative expenses" for the year ended December 31, 2020 and December 31, 2019 respectively on the Consolidated Statement of Operations. The net reduction of cost of goods sold and selling, general and administrative expenses associated with the transition services agreement generally represents a recovery of the related costs. As of December 31, 2020, Tronox had a receivable from AMIC of $1 million recorded within “Prepaid and other assets” on the Consolidated Balance Sheet for expenses paid by Tronox on behalf of AMIC. Similarly, as of December 31, 2020, Tronox had a payable of $2 million recorded within “Accrued liabilities” on the Consolidated Balance Sheet for expenses AMIC paid on behalf of Tronox. Under the acquisition agreement, the stamp duty taxes were agreed to be shared. During the year ended December 31, 2019, Tronox paid $3 million on behalf of Tasnee related to stamp duty taxes. This amount was recorded as a reduction of the total stamp duty taxes paid in "Selling, general and administrative expenses” in the Consolidated Statement of Operations. During 2019, Tasnee prepaid insurance on Tronox's behalf, of which $1 million was expensed to "Cost of goods sold" on the Company's Consolidated Statement of Operations.

At December 31, 2020 and December 31, 2019, Tronox had a receivable due from Tasnee of $ 9 million and $14 million respectively, recorded within “Prepaid and other assets” on the Consolidated Balance Sheet, which relate primarily to amounts arising from transition service agreements, stamp duty taxes paid on behalf of Tasnee, pre-acquisition activities and reimbursement of a tax settlement due to the Australian Taxation Office for pre-acquisition tax periods as discussed in Note 8. At December 31, 2020 and December 31, 2019 Tronox had a payable due to Tasnee of $3 million and $7 million , respectively that are recorded within “Accrued liabilities” on the Consolidated Balance Sheet primarily which relate primarily to pre-acquisition activities and are expected to be settled in the near term.

On December 29, 2019, we entered into an agreement with Cristal to acquire certain assets co-located at our Yanbu facility which produce metal grade $TiCl_4$ ("MGT"). Consideration for the acquisition is the assumption by Tronox of a $36 million note payable to Cristal. The MGT is used at a titanium "sponge" plant facility, 65% of the ownership interests of which are held by Advanced Metal Industries Cluster and Toho Titanium Metal Co. Ltd ("ATTM"), a joint venture between AMIC and Toho Titanium Company Ltd. ATTM uses the $TiCl_4$, which we supply by pipeline, for the production of titanium sponge, a precursor material used in the production of titanium metal.

On December 17, 2020 we completed the MGT transaction. Repayment of the $ 36 million note payable is based on a fixed U.S. dollar per metric ton quantity of MGT delivered by us to ATTM over time and therefore the ultimate maturity date is variable in nature. If ATTM fails to purchase MGT from us under certain contractually agreed upon conditions, then at our election we may terminate the MGT supply agreement with ATTM and will no longer owe any amount under the loan agreement with Cristal. We currently estimate the ultimate maturity to be between approximately five and seven years, subject to actual future MGT production levels. The interest rate on the note payable is based on the SAIBOR plus a premium. As of December 31, 2020, the outstanding balance of the note payable was $36 million, of which $5 million is expected to be paid within the next twelve months.

As a result of the transactions we have entered into related to the MGT assets, Tronox recorded $ 1 million and $5 million for purchase of chlorine gas for the three months and year ended December 31, 2020, respectively from ATTM and such amounts are recorded in "Cost of goods sold" on the Consolidated Statement of Operations. The amount due to ATTM as of December 31, 2020 for the purchase of chlorine gas was $3 million and is recorded within “Accrued liabilities” on the Consolidated Balance

Sheet. There were no purchases of chlorine gas for the year ended December 31, 2019. In addition, during the three months and year ended December 31, 2020, Tronox recorded $6 million and $25 million, respectively, for MGT sales made to AMIC. During the year ended December 31, 2019, Tronox recorded $5 million for $TiCl_4$ product sales made to AMIC. The $TiCl_4$ product sales amounts are recorded in “Net sales” on the Consolidated Statement of Operations. At December 31, 2020 and December 31, 2019, Tronox had a receivable from AMIC of $7 million and $5 million, respectively, from MGT sales that is recorded within “Prepaid and other assets” on the Consolidated Balance Sheet.

Prior to the Cristal acquisition, we also acquired TiO_2 feedstock from AMIC for consumption in production of TiO_2. As of December 31, 2019, we had purchased $11 million of feedstock from AMIC and all payables had been settled as of December 31, 2019. There were no purchases of feedstock from AMIC in 2020.

25. Segment Information

We operate our business under one operating segment, Tronox, which is also our reportable segment. The Company's chief operating decision maker, who is its Co-CEOs, reviews financial information presented at the consolidated level for purposes of allocating resources and evaluating financial performance. Since we operate our business under one segment, there is no difference between our consolidated results and segment results.

We disaggregate revenue from contracts with customers by product type and geographic area as well as sales based on country of production. We believe this level of disaggregation appropriately depicts how the nature, amount, timing and uncertainty of our revenue and cash flows are affected by economic factors and reflects how our business is managed.

During 2020, 2019 and 2018 our ten largest third-party customers represented 32%, 31%, and 37%, respectively, of our consolidated net sales. During 2020, 2019, and 2018, no single customer accounted for 10 % of our consolidated net sales.

Net sales to external customers based on country of production, were as follows:

	Year Ended December 31,		
	2020	2019	2018
U.S. operations	$ 653	$ 676	$ 685
International operations:			
United Kingdom	301	218	—
Australia	637	674	444
South Africa	330	370	444
Other - international	837	704	246
Total net sales	$ 2,758	$ 2,642	$ 1,819

See Note 5 for further information on revenues.

There is no difference between the total consolidated assets of continuing operations and our segment assets. Property, plant and equipment, net, mineral leaseholds, net, and lease right of use assets, net by geographic region, were as follows:

	December 31,	
	2020	2019
U.S. operations	$ 261	$ 255
International operations:		
United Kingdom	101	93
Saudi Arabia	262	215
South Africa	768	799
Australia	995	1,109
Other - international	256	244
Total	$ 2,643	$ 2,715

26. Quarterly Results of Operations (Unaudited)

The following represents our unaudited quarterly results for the years ended December 31, 2020 and 2019. These quarterly results were prepared in conformity with generally accepted accounting principles and reflect all adjustments that are, in the opinion of management, necessary for a fair statement of the results, and were of a normal recurring nature.

Unaudited quarterly results for the year ended December 31, 2020:

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Net sales	$ 722	$ 578	$ 675	$ 783
Cost of goods sold	547	449	536	605
Gross profit	175	129	139	178
Net income (loss) from continuing operations	40	(4)	902	57
Net income from discontinued operations, net of tax	—	—	—	—
Net income (loss)	40	(4)	902	57
Net income attributable to noncontrolling interest	8	—	6	12
Net income (loss) attributable to Tronox Holdings plc	$ 32	$ (4)	$ 896	$ 45
Net income (loss) per share, basic	$ 0.23	$ (0.03)	$ 6.24	$ 0.31
Net income (loss) per share, diluted	$ 0.22	$ (0.03)	$ 6.18	$ 0.31

Unaudited quarterly results for the year ended December 31, 2019:

	1st Quarter	2nd Quarter(1)	3rd Quarter(1)	4th Quarter
Net sales	$ 390	$ 791	$ 768	$ 693
Cost of goods sold	307	672	635	545
Contract loss	—	19	—	—
Gross profit	83	100	133	148
Net (loss) income from continuing operations	(30)	(55)	(12)	(5)
Net income (loss) from discontinued operations, net of tax	—	(1)	6	—
Net (loss) income	(30)	(56)	(6)	(5)
Net income attributable to noncontrolling interest	4	6	7	(5)
Net (loss) income attributable to Tronox Holdings plc(1)	$ (34)	$ (62)	$ (13)	$ —
Loss from continuing operations per share, basic and diluted	$ (0.27)	$ (0.41)	$ (0.13)	$ —
Income from discontinued operations per share, basic and diluted	$ —	$ —	$ 0.04	$ —

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(1) During the third quarter of 2019, we recorded an out-of-period adjustment of $7 million to reduce the tax impact of a transaction related to the Cristal acquisition within income from discontinued operations that should have been recorded in the second quarter of 2019. After evaluating the quantitative and qualitative aspects of the adjustments, we concluded the effect of this adjustment, individually and in the aggregate, was not material to our previously issued interim consolidated financial statements and has no effect to our annual 2019 consolidated financial statements.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

Under the supervision of and with the participation of Tronox's management, including our interim Co-CEOs and CFO, we evaluated the effectiveness of the design and operation of our disclosure controls and procedures (as such term is defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended) (the "Exchange Act"), as of December 31, 2020, the end of the period covered by this report. Based on that evaluation, our interim co-CEOs and CFO have concluded that the Company's disclosure controls and procedures were effective as of that date. Tronox's disclosure controls and procedures are designed to ensure that information required to be disclosed by Tronox in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the Commission's rules and forms, and that such information is accumulated and communicated to Tronox's management, including Tronox's interim co-CEOs and CFO, or other person performing similar functions, as appropriate to allow timely decisions regarding required disclosure.

Management's Report on Internal Control Over Financial Reporting

Management of Tronox Holdings plc and its subsidiaries is responsible for establishing and maintaining adequate internal control over financial reporting. Internal controls over financial reporting is a process designed under the supervision of our interim principal co-executive officers and principal financial officer to provide reasonable assurance regarding the reliability of financial reporting and the preparation of the Company's financial statements for external purposes in accordance with U.S. generally accepted accounting principles.

Our internal controls over financial reporting include those policies and procedures that:

- pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the Company;
- provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with U.S. generally accepted accounting principles, and that our receipts and expenditures are being made only in accordance with authorizations of the Company's management and directors; and
- provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on the financial statements.

Management assessed the effectiveness of our internal controls over financial reporting as of December 31, 2020. In making this assessment, management used the criteria in *Internal Control-Integrated Framework* (2013) set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on our assessment using those criteria, management concluded that our internal control over financial reporting as of December 31, 2020 was effective.

Because of its inherent limitations, internal controls over financial reporting may not prevent or detect misstatements. Projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

The effectiveness of the Company's internal control over financial reporting as of December 31, 2020 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report, which appears in Item 8 of this Form 10-K.

Changes in Internal Control Over Financial Reporting

There have been no changes to our internal control over financial reporting during the quarter ended December 31, 2020 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

Information regarding our executive officers, members of the Board of Directors, including its audit committee and audit committee financial experts, as well as information regarding our Code of Ethics and Business Conduct that applies to our interim co-Chief Executive Officers and senior financial officers, will be presented in Tronox Holding plc’s definitive proxy statement for its 2021 annual general meeting of shareholders, which will be filed not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K, under the headings "Proposal 1 - Election of Directors" and "Code of Ethics and Business Conduct" and is incorporated herein by reference.

Effective December 27, 2020, Chairman and Chief Executive Officer Jeffry N. Quinn began a leave of absence, and the Board of Directors immediately appointed John D. Romano and Jean-François Turgeon to be co-Chief Executive Officers on an interim basis. While serving as co-Chief Executive Officers, Mr. Romano and Mr. Turgeon have maintained their respective responsibilities as Executive Vice President, Chief Commercial and Strategy Officer, and Executive Vice President and Chief Operating Officer. In addition, Ilan Kaufthal, Lead Independent Director, was immediately elected Chairman of the Board on an interim basis. Mr. Quinn’s leave of absence began following Mr. Quinn alerting the Board of Directors that he had been referenced as an unnamed individual by the defendant named in an SEC civil complaint and related criminal complaint that alleged insider trading in the shares of Ferro Corporation during Mr. Quinn’s tenure as a director there. Neither Tronox nor Tronox’s shares were referenced in the complaints.

Item 11. Executive Compensation

Information regarding executive officer and director compensation will be presented in Tronox Holdings plc's definitive proxy statement for its 2021 annual general meeting of shareholders, filed not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K, under the headings "Human Resources and Compensation Committee Interlocks and Insider Participation", "2020 Non-Employee Director Compensation" and "Compensation Discussion and Analysis" and is incorporated herein by reference.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Shareholder Matters

Information regarding security ownership of certain beneficial owners and management and related shareholder matters will be presented in Tronox Holdings plc's definitive proxy statement for its 2021 annual general meeting of shareholders, filed not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K, under the heading "Security Ownership of Certain Beneficial Owners" and is incorporated herein by reference.

Equity Compensation Plan Information

The following table provides information as of December 31, 2020 regarding securities issued under the Tronox Holdings plc Amended and Restated Management Equity Incentive Plan (the “Tronox Holdings plc MEIP”).

	Number of securities to be issued upon exercise of outstanding restricted share units and options	Weighted-average exercise price of outstanding options(1)	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in the second column)(2)
Equity compensation plans approved by security holders	8,505,796	$ 21.60	8,755,422
Equity compensation plans not approved by security holders	—	—	—
Total	8,505,796	$ 21.60	8,755,422

(1) Because there is no exercise price for restricted share units, such awards are not included in the weighted-average exercise price.

(2) Each restricted share unit awarded under the Tronox Holdings plc MEIP was granted at no cost to the persons receiving them and represents the contingent right to receive the equivalent number of ordinary shares.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

Information regarding certain relationships and related transactions and director independence will be presented in Tronox Holdings plc's definitive proxy statement for its 2021 annual general meeting of shareholders, filed not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K, under the heading "Certain Relationships and Related Transactions" and is incorporated herein by reference.

Item 14. Principal Accounting Fees and Services.

Information regarding principal accounting fees and services will be presented in Tronox Holdings plc's definitive proxy statement for its 2021 annual general meeting of shareholders, filed not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K, under the heading "Fees Paid to Independent Registered Public Accounting Firm" and is incorporated herein by reference.

PART IV

Item 15. Exhibits, Financial Statement Schedules.

(a) The following documents are filed as part of this Annual Report on Form 10-K:

1. Consolidated Financial Statements

Reference is made to the Index to Consolidated Financial Statements and Consolidated Financial Statement Schedules appearing at “Item 8. Financial Statements and Supplementary Data” in this report.

2. Consolidated Financial Statement Schedules

All financial statement schedules are omitted as they are inapplicable, or the required information has been included in the consolidated financial statements or notes thereto.

3. Exhibits

(b) The exhibits listed in the following table have been filed with, or incorporated by reference into, this Annual Report on Form 10-K.

2.1	Transaction Agreement, dated as of February 21, 2017, by and between Cristal, Tronox Limited and Cristal Inorganic Chemicals Netherlands Coöperatief W.A. (incorporated by reference to Exhibit 2.1 of the Current Report on Form 8-K filed by Tronox Limited on February 21, 2017).
2.2	Amendment No. 1 to Transaction Agreement, dated as of March 1, 2018, by and among The National Titanium Dioxide Company Limited, Tronox Limited and Cristal Inorganic Chemicals Netherlands Coöperatief W.A. (incorporated by reference to Exhibit 2.1 of the Current Report on Form 8-K filed by Tronox Limited on March 1, 2018).
2.3	Amendment No. 2 to Transaction Agreement dated March 28, 2019, by and among The National Titanium Dioxide Company Limited, Tronox Limited, and, solely for certain purposes, Cristal Inorganic Chemicals Netherlands Coöperatief W.A. (incorporated by reference to Exhibit 2.1 of the Current Report on Form 8-K filed on April 2, 2019).
2.4	Stock Purchase Agreement, dated as of March 14, 2019, by and among Tronox Limited, INEOS AG and INEOS Joliet US Holdco, LLC (incorporated by reference to Exhibit 2.1 of the Current Report on Form 8-K filed on March 19, 2019).
2.5	Agreement for the sale and purchase of Tizir Titanium & Iron AS, dated as of May 14, 2020, by and between Tronox Holdings plc, Tronox Titanium Holdings AS, Tizir Limited and Eramet S.A. (incorporated by reference to Exhibit 2.1 of the Current Report on Form 8-K/A filed on May 14, 2020)
3.1	Articles of Association of Tronox Holdings plc (incorporated by reference to Exhibit 3.1 of the Current Report on Form 8-K filed on March 27, 2019).
4.1	Indenture, dated as of September 22, 2017 among Tronox Finance plc, the Company and the other guarantors named therein and Wilmington Trust, National Association, as trustee (incorporated by reference to Exhibit 4.1 of the Current Report on Form 8-K filed on September 25, 2017).
4.2	Indenture, dated as of April 6, 2018, among Tronox Incorporated, the Company and other guarantors named therein and Wilmington Trust, National Association, as trustee (incorporated by reference to Exhibit 4.1 of the Current Report on Form 8-K filed on April 6, 2018).
4.3	First Supplemental Indenture dated as of April 1, 2019 among Tronox Finance plc, the guarantors named therein and Wilmington Trust, National Association, as trustee (incorporated by reference to Exhibit 4.2 of the Quarterly Report on Form 10-Q filed on May 10, 2019).
4.4	First Supplemental Indenture dated as of April 1, 2019 among Tronox Incorporated, the guarantors named therein and Wilmington Trust, National Association, as trustee (incorporated by reference to Exhibit 4.3 of the Quarterly Report on Form 10-Q filed on May 10, 2019).
4.5	Second Supplemental Indenture dated as of April 12, 2019 among Tronox Finance plc, the guarantors named therein and Wilmington Trust, National Association, as trustee (incorporated by reference to Exhibit 4.1 of the Current Report on Form 8-K filed on April 15, 2019).
4.6	Second Supplemental Indenture dated as of April 12, 2019 among Tronox Incorporated, the guarantors named therein and Wilmington Trust, National Association, as trustee (incorporated by reference to Exhibit 4.2 of the Current Report on Form 8-K filed on April 15, 2019).
4.7	Third Supplemental Indenture dated as of August 30, 2019 among Tronox Finance plc, the guarantors named therein and Wilmington Trust, National Association, as trustee (incorporated by reference to Exhibit 4.1 of the Current Report on Form 8-K filed on September 3, 2019).
4.8	Third Supplemental Indenture dated as of August 30, 2019 among Tronox Incorporated, the guarantors named therein and Wilmington Trust, National Association, as trustee (incorporated by reference to Exhibit 4.2 of the Current Report on Form 8-K filed on September 3, 2019).
4.9	Fourth Supplemental Indenture dated as of January 15, 2020 among Tronox Finance plc, the guarantors named therein and Wilmington Trust, National Association, as trustee (incorporated by reference to Exhibit 4.9 of the Annual Report on Form 10-K filed on March 16, 2020).

4.10	Fourth Supplemental Indenture dated as of January 15, 2020 among Tronox Incorporated, the guarantors named therein and Wilmington Trust, National Association, as trustee (incorporated by reference to Exhibit 4.10 of the Annual Report on Form 10-K filed on March 16, 2020).
4.11	Specimen ordinary share certificate of Tronox Holdings plc (incorporated by reference to Exhibit 4.1 of the Current Report on Form 8-K filed on March 27, 2019).
4.12	Shareholders Agreement, dated April 10, 2019, by and between Tronox Holdings plc, Cristal Inorganic Chemicals Netherlands Coöperatief W.A., The National Titanium Dioxide Company Limited, Gulf Investment Corporation and Dr. Talal Al-Shair (incorporated by reference to Exhibit 4.1 of the Current Report on Form 8-K filed on April 11, 2019).
4.13	Description of Securities of the Registrant (incorporated by reference to Exhibit 4.13 of the Annual Report on Form 10-K filed on March 16, 2020).
4.14	Indenture, dated as of May 1, 2020 among Tronox Incorporated, the Company and the other guarantors named therein and Wilmington Trust, National Association, as trustee (incorporated by reference to Exhibit 4.1 of the Current Report on Form 8-K filed on May 1, 2020).
10.1	Shareholders' Agreement by and between Tronox Sands Holdings PTY Limited, Tronox Limited, Exxaro Resources Limited, Exxaro Sands (Proprietary) Limited and Exxaro TSA Sands Proprietary Limited (incorporated by reference to Exhibit 10.2 of the Current Report on Form 8-K filed on June 20, 2012).
10.2	Shareholder's Deed by and between Tronox Holdings plc and Exxaro Resources Limited, dated March 22, 2019 (incorporated by reference to Exhibit 10.1 of the Current Report on Form 8-K filed on March 27, 2019).
10.3*	Tronox Holdings plc Amended and Restated Management Equity Incentive Plan (incorporated by reference to Exhibit 10.2 of the Current Report on Form 8-K filed on March 27, 2019).
10.4*	Tronox Holdings plc Amended and Restated Annual Bonus Incentive Plan (incorporated by reference to Exhibit 10.3 of the Current Report on Form 8-K filed on March 27, 2019).
10.5*	Employment Agreement entered into as of July 25, 2013 by and between Tronox LLC and Jean Francois Turgeon (incorporated by reference to Exhibit 10.1 of the Current Report on Form 8-K filed on August 7, 2013).
10.6*	Amended and Restated Employment Agreement dated as of December 23, 2014 by and between Tronox LLC and John Romano (incorporated by reference to Exhibit 10.1 to the Current Report on Form 8-K filed on December 24, 2014).
10.7*	Employment Agreement dated as of June 15, 2012 by and between Tronox LLC and Willem Van Niekerk (incorporated by reference to Exhibit 10.29 of the Annual Report on Form 10-K filed on February 26, 2015).
10.8*	Employment Agreement Extension entered into as of July 13, 2016 by and between Tronox LLC and Jean-Francois Turgeon (incorporated by reference to Exhibit 10.2 to the Current Report on Form 8-K filed on July 15, 2016).
10.9*	Offer letter, dated November 7, 2019 by and between Tronox Holdings plc and Timothy Carlson (incorporated by reference to Exhibit 10.1 to the Quarterly Report on Form 10-Q filed on November 12, 2019).
10.10*	General form of 2020 executive officer Time-Based Restricted Share Unit Agreement (incorporated by reference to Exhibit 10.10 of the Annual Report on Form 10-K filed on March 16, 2020).
10.11*	General form of 2020 executive officer TSR Performance-Based Restricted Share Unit Agreement (incorporated by reference to Exhibit 10.11 of the Annual Report on Form 10-K filed on March 16, 2020).
10.12*	General form of 2020 executive officer ORONA Performance-Based Restricted Share Unit Agreement (incorporated by reference to Exhibit 10.12 of the Annual Report on Form 10-K filed on March 16, 2020).
10.13*	General form of Director Grant Restricted Share Unit Agreement (incorporated by reference to Exhibit 10.3 to the Quarterly Report on Form 10-Q filed on May 4, 2017).
10.14*	General form of Cristal Transaction Integration Synergy Savings Performance-Based Restricted Share Unit Agreement (incorporated by reference to Exhibit 10.4 to the Quarterly Report on Form 10-Q filed on May 4, 2017).
10.15	Revolving Syndicated Facility Agreement, dated as of September 22, 2017 among the Company, Tronox US Holdings Inc. and certain of the Company's other subsidiaries along with a syndicate of lenders and Wells Fargo Bank, National Association, as issuing bank, swingline lender, administrative agent, and collateral agent (incorporated by reference to Exhibit 10.1 of the Current Report on Form 8-K filed on September 25, 2017).
10.16	First Lien Term Loan Credit Agreement, dated as of September 22, 2017 among Tronox Finance LLC and its unrestricted subsidiary Tronox Blocked Borrower LLC, and certain of the Company's other subsidiaries, along with a syndicate of lenders and Bank of America, N.A. as administrative agent and collateral agent (incorporated by reference to Exhibit 10.2 of the Current Report on Form 8-K filed on September 25, 2017).
10.17*	Amended and Restated Employment Agreement dated as of March 28, 2019 by and between the Company and Mr. Jeffry Quinn (incorporated by reference to Exhibit 10.1 of the Current Report on Form 8-K filed on April 2, 2019).
10.18	Exxaro Mineral Sands Transaction Completion Agreement, dated as of November 26, 2018, by and among Tronox Limited, the other Tronox Parties named therein and Exxaro Resources Limited (incorporated by reference to Exhibit 2.1 to the Current Report on Form 8-K filed on November 28, 2018).

10.19	Amendment Agreement to Shareholders' Agreement Relating to Tronox KZN Sands and Tronox Mineral Sands dated November 27, 2018, by and between Tronox Sands Holding PTY Limited, Tronox Limited, Exxaro Resources Limited, Tronox KZN Sands (Proprietary) Limited and Tronox Mineral Sands Proprietary Limited (incorporated by reference to Exhibit 10.22 of the Annual Report on Form 10-K filed on February 28, 2019).
10.20	Deed of Amendment to Shareholders' Deed, dated November 27, 2018, by and between Tronox Limited and Exxaro Resources Limited (incorporated by reference to Exhibit 10.23 of the Annual Report on Form 10-K filed on February 28, 2019).
10.21	Amendment No. 1 and Waiver to Revolving Syndicated Facility Agreement, dated as of February 26, 2019 among the Company, Tronox US Holdings Inc. and certain of the Company's other subsidiaries along with the party thereto and Wells Fargo Bank, National Association, as administrative agent (incorporated by reference to Exhibit 10.24 of the Annual Report on Form 10-K filed on February 28, 2019).
10.22	Amendment No. 1 and Waiver to First Lien Term Loan Credit Agreement, dated as of February 26, 2019 among the Company, Tronox Finance LLC and certain of the Company's other subsidiaries, along with the lenders party thereto and Bank of America, N.A. as administrative agent (incorporated by reference to Exhibit 10.25 of the Annual Report on Form 10-K filed on February 28, 2019).
10.23	Consent and Amendment No. 2 to the Revolving Syndicated Facility Agreement, dated as of March 22, 2019, among the Company and certain of the Company's subsidiaries, with the lenders party thereto and Wells Fargo Bank, National Association, as administrative agent (incorporated by reference to Exhibit 10.1 of the Current Report on Form 8-K filed on March 26, 2019).
10.24	Amendment No. 2 to the First Lien Term Loan Credit Agreement, dated as of March 22, 2019, among Tronox Finance LLC, Tronox Blocked Borrower LLC and certain of the Company's other subsidiaries, with the lenders party thereto and Bank of America, N.A. as administrative agent and collateral agent (incorporated by reference to Exhibit 10.2 of the Current Report on Form 8-K filed on March 26, 2019).
10.25	Form of Director Deed of Indemnification (incorporated by reference to Exhibit 10.4 of the Current Report on Form 8-K filed on March 27, 2019).
10.26	Agreement for the Provision of Depositary Services and Custody Services, dated as of March 14, 2019, in respect of Tronox Holdings plc Depositary Receipts among Computershare Trust Company, N.A., Tronox Holdings plc and Exxaro Resources Limited (incorporated by reference to Exhibit 10.5 of the Current Report on Form 8-K filed on March 27, 2019).
10.27	Agreement for the Provision of Depositary Services and Custody Services, dated as of April 10, 2019, in respect of Tronox Holdings plc Depositary Receipts among Computershare Trust Company, N.A., Tronox Holdings plc, Cristal Inorganic Chemicals Netherlands Coöperatief W.A. and all other holders from time to time of depositary receipts issued in accordance herewith (incorporated by reference to Exhibit 10.1 of the Current Report on Form 8-K filed on April 15, 2019).
10.28*	Letter Agreement entered into as of December 27, 2020 by and between Tronox Holdings plc and Jean-Francois Turgeon (filed herewith).
10.29*	Letter Agreement entered into as of December 27, 2020 by and between Tronox Holdings plc and John Romano (filed herewith).
10.30*	General form of 2021 executive officer Time-Based Restricted Share Unit Agreement (filed herewith).
10.31*	General form of 2021 executive officer TSR Performance-Based Restricted Share Unit Agreement (filed herewith).
14.1	Tronox Code of Ethics and Business Conduct, effective March 27, 2019 (incorporated by reference to Exhibit 14.1 of the Annual Report on Form 10-K filed on March 16, 2020).
21.1	Subsidiaries of Tronox Holdings plc. (filed herewith)
23.1	Consent of PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm for Tronox Holdings plc. (furnished herewith)
24.0	Power of Attorney (filed herewith)
31.1	Rule 13a-14(a) Certification of John Romano. (furnished herewith)
31.2	Rule 13a-14(a) Certification of Jean-Francois Turgeon. (furnished herewith)
31.3	Rule 13a-14(a) Certification of Timothy Carlson. (furnished herewith)
32.1	Section 1350 Certification for John Romano. (furnished herewith)
32.2	Section 1350 Certification for Jean-Francois Turgeon. (furnished herewith)
32.3	Section 1350 Certification for Timothy Carlson. (furnished herewith)
101.INS	Inline XBRL Instance Document (filed herewith)
101.SCH	Inline XBRL Taxonomy Extension Schema Document (filed herewith)
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document (filed herewith)
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document (filed herewith)
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document (filed herewith)

101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document (filed herewith)
104	The cover page from the Company's Annual Report on Form 10-K for the year ended December 31, 2020, which has been formatted in Inline XBRL, and included with Exhibit 101.

* Indicates management contract or compensatory plan or arrangement.

Item 16. Form 10-K Summary.

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized, on this 23rd day of February 2021.

TRONOX HOLDINGS PLC
(Registrant)

By:	/s/ Timothy Carlson
Name:	Timothy Carlson
Title:	Senior Vice President, Chief Financial Officer and Principal Accounting Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ John Romano John Romano	Interim Co-Chief Executive Officer (Principal Executive Officer)	February 23, 2021
/s/ Jean-Francois Turgeon Jean-Francois Turgeon	Interim Co-Chief Executive Officer (Principal Executive Officer)	February 23, 2021
/s/ Timothy Carlson Timothy Carlson	Senior Vice President and Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	February 23, 2021
* Ilan Kaufthal	Interim Chairman of the Board of Directors	February 23, 2021
* Mutlaq Al-Morished	Director	February 23, 2021
* Vanessa Guthrie	Director	February 23, 2021
* Stephen Jones	Director	February 23, 2021
* Moazzam Khan	Director	February 23, 2021
* Peter B. Johnston	Director	February 23, 2021
* Sipho Nkosi	Director	February 23, 2021
* Ginger M. Jones	Director	February 23, 2021
Jeffry Quinn	Director	
*By: /s/ Jeffrey Neuman Jeffrey Neuman, Attorney-in-fact	Senior Vice President, General Counsel and Secretary	February 23, 2021

Exhibit 10.28

December 27, 2020

Jean-François Turgeon

Re: Appointment as Interim Co-Chief Executive Officer

Dear JF:

This letter is to confirm your appointment as an Interim Co-Chief Executive Officer (“Interim Co-CEO”) of Tronox Holdings plc (the “Company”) effective as of December 27, 2020. You agree to serve in that capacity during the “Interim Period”, which shall commence on December 27, 2020 and continue until such time that: (i) Jeff Quinn returns from his leave of absence and resumes the role of the Company’s Chief Executive Officer; (ii) the Company’s Board of Directors (the “Board”) appoints a permanent Chief Executive Officer or permanent Co-Chief Executive Officers; or (iii) the Board determines in its sole discretion that you no longer shall serve as an Interim Co-CEO.

During the Interim Period, you agree to perform such duties and responsibilities customarily associated with the position of an Interim Co-CEO in a business the size and nature of the Company and/or as may be directed by the Board. As compensation for your services as an Interim Co-CEO, you shall continue to receive the same compensation and benefits that you have been receiving from the Company pursuant to your current Amended and Restated Employment Agreement dated December 23, 2014 (the “Employment Agreement”). In addition thereto, in recognition of your additional responsibilities as an Interim Co-CEO, you also shall receive:

(a) an addition to your base salary of $25,000 per month during the Interim Period;

(b) a one-time special bonus of $500,000 to be paid within ten (10) business days after the end of the Interim Period, provided that you have not resigned without “Good Reason” and the Board has not terminated your employment for “Cause” prior to such payment date (with “Good Reason” and “Cause” being defined as set forth in your Employment Agreement); and

(c) a one-time LTI award of Restricted Stock Units with a value of $750,000 that shall vest on March 5, 2023 (the “Vesting Date”), provided that you continuously remain employed with the Company and/or its subsidiaries and affiliates from December 28, 2020 through the Vesting Date.

You agree that except as otherwise set forth in this letter, your Employment Agreement shall remain in full force and effect. You also agree that if and when the Board removes you from the position of Interim Co-CEO, such removal shall not trigger or constitute “Good Reason” for resignation as that term is defined in your Employment Agreement, provided that the Company returns you to a position that is the same or equivalent in terms of responsibility and compensation with the position you held at the Company prior to your appointment as an Interim Co-CEO.

Tronox Holdings plc
One Stamford Plaza, 263 Tresser Blvd.
Suite 1100
Stamford, CT 06901
T: +1-203-705-3800 | **W:** www.tronox.com

We appreciate your willingness to accept the role of Interim Co-CEO and are confident in your ability to contribute significantly to the Company's continued success.

Best regards,

/s/ Ilan Kaufthal

Ilan Kaufthal
Chairman of the Board

Acknowledgement:

Agreed on this the 27th day of December 2020

__/s/ Jean-Francois Turgeon______________
By: Jean-François Turgeon

Exhibit 10.29

December 27, 2020

John Romano

Re: Appointment as Interim Co-Chief Executive Officer

Dear John:

This letter is to confirm your appointment as an Interim Co-Chief Executive Officer ("Interim Co-CEO") of Tronox Holdings plc (the "Company") effective as of December 27, 2020. You agree to serve in that capacity during the "Interim Period", which shall commence on December 27, 2020 and continue until such time that: (i) Jeff Quinn returns from his leave of absence and resumes the role of the Company's Chief Executive Officer; (ii) the Company's Board of Directors (the "Board") appoints a permanent Chief Executive Officer or permanent Co-Chief Executive Officers; or (iii) the Board determines in its sole discretion that you no longer shall serve as an Interim Co-CEO.

During the Interim Period, you agree to perform such duties and responsibilities customarily associated with the position of an Interim Co-CEO in a business the size and nature of the Company and/or as may be directed by the Board. As compensation for your services as an Interim Co-CEO, you shall continue to receive the same compensation and benefits that you have been receiving from the Company pursuant to your current Amended and Restated Employment Agreement dated December 23, 2014 (the "Employment Agreement"). In addition thereto, in recognition of your additional responsibilities as an Interim Co-CEO, you also shall receive:

(a) an addition to your base salary of $25,000 per month during the Interim Period;

(b) a one-time special bonus of $500,000 to be paid within ten (10) business days after the end of the Interim Period, provided that you have not resigned without "Good Reason" and the Board has not terminated your employment for "Cause" prior to such payment date (with "Good Reason" and "Cause" being defined as set forth in your Employment Agreement); and

(c) a one-time LTI award of Restricted Stock Units with a value of $750,000 that shall vest on March 5, 2023 (the "Vesting Date"), provided that you continuously remain employed with the Company and/or its subsidiaries and affiliates from December 28, 2020 through the Vesting Date.

You agree that except as otherwise set forth in this letter, your Employment Agreement shall remain in full force and effect. You also agree that if and when the Board removes you from the position of Interim Co-CEO, such removal shall not trigger or constitute "Good Reason" for resignation as that term is defined in your Employment Agreement, provided that the Company returns you to a position that is the same or equivalent in terms of responsibility and compensation with the position you held at the Company prior to your appointment as an Interim Co-CEO.

Tronox Holdings plc
One Stamford Plaza, 263 Tresser Blvd.
Suite 1100
Stamford, CT 06901
T: +1-203-705-3800 | **W:** www.tronox.com

We appreciate your willingness to accept the role of Interim Co-CEO and are confident in your ability to contribute significantly to the Company's continued success.

Best regards,

/s/ Ilan Kaufthal

Ilan Kaufthal
Chairman of the Board

Acknowledgement:

Agreed on this the 27th day of December 2020

__/s/ John D. Romano________________
By: John D. Romano

Exhibit 10.30

TIME-BASED RESTRICTED SHARE UNIT AGREEMENT
PURSUANT TO THE
AMENDED AND RESTATED
TRONOX HOLDINGS PLC
MANAGEMENT EQUITY INCENTIVE PLAN

*** * * * ***

Participant:

Grant Date: February 4, 2021

Vest Dates:

1. **March 5, 2022**
2. **March 5, 2023**
3. **March 5, 2024**

If any Vest Date is not a trading day on the NYSE, the Vest Date will be the next trading day.

Number of Restricted Share Units granted:

*** * * * ***

THIS RESTRICTED SHARE UNIT AWARD AGREEMENT (this "Agreement"), dated as of the Grant Date specified above, is entered into by and between Tronox Holdings plc (the "Company"), and the Participant specified above, pursuant to the Amended and Restated Tronox Holdings plc Management Equity Incentive Plan (the "Plan"), which is administered by the Committee; and

WHEREAS, it has been determined by the Committee under the Plan that it would be in the best interests of the Company to grant and issue the Restricted Share Units provided herein to the Participant on and subject to the terms and conditions of the Plan and this Agreement ("Time RSUs").

NOW, THEREFORE, in consideration of the mutual covenants and promises hereinafter set forth and for other good and valuable consideration, the parties hereto hereby mutually covenant and agree as follows:

1. **Incorporation By Reference; Plan Document Receipt Certain Defined Terms**. This Agreement is an Award Agreement for the purpose of the Plan. This Agreement is subject in all respects to the terms and provisions of the Plan (including, without limitation, any amendments thereto adopted at any time and from time to time unless such amendments are expressly intended not to apply to the Award provided hereunder), all of which terms and provisions are made a part of and incorporated in this Agreement as if they were each expressly set forth herein. Any capitalized term not defined in this Agreement shall have the same

meaning as is ascribed thereto in the Plan. The Participant hereby acknowledges receipt of a true copy of the Plan and that the Participant has read the Plan carefully and fully understands its content. Unless otherwise provided herein, in the event of any conflict between the terms of this Agreement and the terms of the Plan, the terms of the Plan shall control.

2. **Grant of Restricted Share Unit Award**. The Company hereby grants to the Participant on or as soon as practicable after the date of execution of this Agreement the number of Time RSUs specified above. The Participant agrees and understands that except as provided by the Plan nothing contained in this Agreement provides, or is intended to provide, the Participant with any protection against potential future dilution of the Participant's interest in the Company for any reason and no adjustments shall be made for dividends in cash or other property, distributions or other rights in respect of any such shares, except as otherwise specifically provided for in the Plan or this Agreement. The Participant also agrees and understands that the Time RSUs are not Shares and do not confer rights on the Participant as a Shareholder.

3. **Vesting**.

(a) General. Except as otherwise provided in this Section 3, the Time RSUs subject to this Agreement shall vest in three equal annual installments with one installment vesting on each Vest Date, provided that the Participant has at all times during the period commencing on the Grant Date and ending on each such Vest Date, respectively, been employed by the Company or one of its Subsidiaries.

(b) Termination in General. Except as otherwise set forth in Sections 3(c), 3(d), 3(e), 3(f), and 3(g) hereof, all unvested Time RSUs shall immediately be canceled and forfeited upon a Termination for any reason.

(c) Termination for Death or Disability. Upon a Participant's Termination due to the Participant's death or Disability, all unvested Time RSUs shall immediately become vested upon the date of such Termination.

(d) Termination for Normal Retirement. Upon a Participant's Termination due to the Participant's Normal Retirement prior to the first Vest Date, the number of Time RSUs subject to this Agreement scheduled to vest on the first Vest Date shall immediately become vested upon the date of such Termination and all other unvested Time RSUs subject to this Agreement shall immediately be canceled and forfeited upon Termination. Upon a Participant's Termination due to the Participant's Normal Retirement on or after the first Vest Date, all unvested Time RSUs subject to this Agreement shall immediately become vested upon the date of such Termination. For purposes of this Agreement, "Retirement" shall mean a Termination other than a termination for Cause at or after age 65 or such earlier date after age 50 as may be approved by the Committee with regard to such Participant, in its sole discretion, subject to Section 409A of the Code.

(e) Termination without Cause. Upon a Participant's Termination by the Company without Cause, a pro rata portion of the unvested Time RSUs that would have become vested on the Vest Date following the date of such Termination shall become vested in an amount determined by multiplying the number of Time RSUs that were eligible to become vested on the Vest Date following the date of such Termination by a fraction, the numerator of which is the number of calendar days from the Vest Date immediately preceding the date of Termination to the date of Termination and the denominator of which is the number of calendar days from the Vest Date immediately preceding the date of Termination to the next Vest Date after the date of such Termination. If the Participant's date of Termination is prior to the first Vest Date, a pro rata portion of the unvested Time RSUs that would have become vested on the first Vest Date shall become vested in an amount determined by multiplying the number of Time RSUs that were eligible to become vested on the first Vest Date by a fraction, the numerator of which is the number of calendar days from the Grant Date to the date of Termination and the denominator of which is the number of calendar days from the Grant Date to the first Vest Date.

(f) Change in Control. Except as otherwise provided in a Participant's employment agreement, if any, Section 12.1 of the Plan shall govern the treatment of the Time RSUs in connection with a Change in Control.

(g) Committee Discretion to Accelerate Vesting. Notwithstanding the foregoing, the Committee may, in its sole discretion (but subject to applicable law), provide for accelerated vesting of the Time RSUs at any time and for any reason.

4. **Delivery of Unrestricted Shares**. If and when Time RSUs awarded by this Agreement become vested, the Units shall cease to be liable to be forfeited by the Participant. By no later than ten (10) days following the date on which any Time RSUs awarded hereunder become vested the Company, subject to satisfaction of the tax withholding requirements under Section 10 below, shall (i) deliver to the Participant a certificate or book-entry transfer for a number of unrestricted Shares equal to the total number of Time RSUs that vested on such date and (ii) make a Dividend Equivalent Payment to the Participant with respect to such Time RSUs as provided in Section 7.5.5(b) of the Plan.

5. **Dividends and Other Distributions; Voting Rights**.

(a) Section 7.5.5(b) of the Plan shall apply with respect to the Time RSUs.

(b) Participants have no voting rights during period of restrictions for Time RSUs.

(c) Section 7.5.6 of the Plan shall apply with respect to the Time RSUs (unless the Committee determines otherwise in any particular case pursuant to Section 4.3 of the Plan).

6. **No transferability**. No Time RSUs granted hereunder may be sold, transferred, pledged, assigned or otherwise alienated or hypothecated.

7. **Entire Agreement; Amendment**. This Agreement, together with the Plan, contains the entire agreement between the parties hereto with respect to the subject matter contained herein, and supersedes all prior agreements or prior understandings, whether written or oral, between the parties relating to such subject matter. The Committee shall have the right, in its sole discretion, to modify or amend this Agreement from time to time in accordance with and as provided in the Plan. This Agreement may also be modified or amended by writing signed by both the Company and the Participant. The Company shall give written notice to the Participant of any such modification or amendment of this Agreement as soon as practicable after the adoption thereof.

8. **Acknowledgment of Participant**. This award of Time RSUs does not entitle Participant to any benefit other than that granted under this Agreement. Any benefits granted under this Agreement are not part of the Participant's ordinary salary, and shall not be considered as part of such salary in the event of severance, redundancy or resignation. Participant understands and accepts that the benefits granted under this Agreement are entirely at the discretion of the Company and that the Company retains the right to amend or terminate this Agreement and the Plan at any time, at its sole discretion and without notice.

9. **Governing Law**. This Agreement shall be governed by and construed in accordance with the laws of the State of New York, without reference to the principles of conflict of laws thereof.

10. **Withholding of Tax**. As a condition to the distribution of Shares to the Participant, the Participant shall be required to pay in cash, or to make other arrangements satisfactory to the Company (including, without limitation, authorizing withholding from payroll and any other amounts payable to the Participant), the amount that is sufficient to satisfy any federal, provincial, state, local and foreign taxes of any kind (including, but not limited to, the Participant's FICA and SDI obligations) in any and all jurisdictions which the Company, in its sole discretion, deems necessary to comply with the Code and/or any other applicable law, rule or regulation with respect to the Time RSUs. Unless the tax withholding obligations of the Company are satisfied, the Company shall have no obligation to issue a certificate or book-entry transfer for such Shares (except as required by applicable law). The Committee, in its sole discretion and pursuant to such procedures as it may specify from time to time, may permit the Participant to satisfy his or her tax obligations, in whole or in part by one or more of the following (without limitation): (a) paying cash, (b) electing to have the Company withhold otherwise deliverable Shares having a Fair Market Value equal to the amount required to be withheld or (c) selling a sufficient number of such Shares otherwise deliverable to Participant through such means as the Company may determine in its sole discretion (whether through a broker or otherwise) equal to the amount required to be withheld.

11. **Acceptance**. The Participant shall forfeit the Time RSUs if the Participant does not execute this Agreement within a period of sixty (60) days from the date that the Participant receives this Agreement (or such other period as the Committee shall provide). The Participant consents to receive such documents by electronic delivery through an on-line or electronic system established and maintained by the Company or another third party designated by the

Company, including the acceptance of the Award and the execution of this Agreement through electronic signature, and participant agrees to be bound by such electronic acceptance and such electronic signature.

12. **Securities Representations**. The Time RSUs are being issued to the Participant and this Agreement is being made by the Company in reliance upon the following express representations and warranties of the Participant. The Participant acknowledges, represents and warrants that:

(a) The Participant has been advised that the Participant may be an "affiliate" within the meaning of Rule 144 under the Securities Act and in this connection the Company is relying in part on the Participant's representations set forth in this Section 12.

(b) If the Participant is deemed an affiliate within the meaning of Rule 144 of the Securities Act, the Time RSUs must be held indefinitely unless an exemption from any applicable resale restrictions is available or the Company files an additional registration statement (or a "re-offer prospectus") with regard to the Time RSUs and the Company is under no obligation to register the Time RSUs (or to file a "re-offer prospectus").

(c) If the Participant is deemed an affiliate within the meaning of Rule 144 of the Securities Act, the Participant understands that (i) the exemption from registration under Rule 144 will not be available unless (A) a public trading market then exists for the Shares of the Company, (B) adequate information concerning the Company is then available to the public, and (C) other terms and conditions of Rule 144 or any exemption therefrom are complied with, and (ii) any sale of the vested Time RSUs hereunder may be made only in limited amounts in accordance with the terms and conditions of Rule 144 or any exemption therefrom.

13. **No Right to Employment**. Any questions as to whether and when there has been a termination of such employment and the cause of such termination shall be determined in the sole discretion of the Committee. Nothing in this Agreement shall interfere with or limit in any way the right of the Company to terminate the Participant's employment or service at any time, for any reason and with or without cause.

14. **Notices**. Any notice which may be required or permitted under this Agreement shall be in writing, and shall be delivered in person or via facsimile transmission, overnight courier service or certified mail, return receipt requested, postage prepaid, properly addressed as follows:

(a) If such notice is to the Company, to the attention of the General Counsel of the Company or Secretary of the Company at such other address as the Company, by notice to the Participant, shall designate in writing from time to time.

(b) If such notice is to the Participant, at his/her address as shown on the Company's records, or at such other address as the Participant, by notice to the Company, shall designate in writing from time to time.

15. **Compliance with Laws**. The issuance of the Time RSUs pursuant to this Agreement shall be subject to, and shall comply with, any applicable requirements of any foreign and U.S. federal and state securities laws, rules and regulations (including, without limitation, the provisions of the Securities Act, the Exchange Act, the Corporations Act, and in each case any respective rules and regulations promulgated thereunder) and any other law or regulation applicable thereto. The Company shall not be obligated to issue the Time RSUs or any of the Shares pursuant to this Agreement if any such issuance would violate any such requirements.

16. **Binding Agreement; Assignment**. This Agreement shall inure to the benefit of, be binding upon, and be enforceable by the Company and its successors and assigns. The Participant shall not assign (except as provided by Section 6 hereof) any part of this Agreement without the prior express written consent of the Company.

17. **Counterparts**. This Agreement may be executed in one or more counterparts, each of which shall be deemed to be an original, but all of which shall constitute one and the same instrument.

18. **Headings**. The titles and headings of the various sections of this Agreement have been inserted for convenience of reference only and shall not be deemed to be a part of this Agreement.

19. **Further Assurances**. Each party hereto shall do and perform (or shall cause to be done and performed) all such further acts and shall execute and deliver all such other agreements, certificates, instruments and documents as either party hereto reasonably may request in order to carry out the intent and accomplish the purposes of this Agreement and the Plan and the consummation of the transactions contemplated thereunder.

20. **Severability**. The invalidity or unenforceability of any provisions of this Agreement in any jurisdiction shall not affect the validity, legality or enforceability of the remainder of this Agreement in such jurisdiction or the validity, legality or enforceability of any provision of this Agreement in any other jurisdiction, it being intended that all rights and obligations of the parties hereunder shall be enforceable to the fullest extent permitted by law.

21. **Disclosure and Use of Information.** This Section 21 shall apply if you reside outside of the United States and its territories and only to the extent required by applicable law. You hereby acknowledge that the Company holds and processes information relating to your employment, including the nature and amount of your compensation, information relating to grants made by the Company to you under this Plan or other share incentive plans, your bank details, social security or national identity number, and other personal details (“Personal Data”). You further acknowledge that the Company is part of a group of companies operating internationally, and that, in connection with the Plan or other share incentive plans, it may be necessary for the Company to make Personal Data available to its subsidiaries and affiliates, to third-party advisors and administrators of any share incentive plans or arrangements, to service providers and other third parties in the ordinary course of business, and to regulatory authorities and tribunals (the “Third Parties”); and that these Third Parties may be located in countries other than your country of residence (the “Third Countries”), including the United States and other

countries outside the European Economic Area. You acknowledge that the laws of these Third Counties may not provide for the level of data protection equivalent to that provided for in your country of residence. Any Personal Data made available by the Company as described above in relation to the Plan or any share incentive plan will be for the purpose of administration and management of the Plan or any other share incentive plan of the Company, on behalf of the Company, or as otherwise permitted or required by law. You hereby authorize the Company to hold and process the Personal Data for these purposes, and to transfer to the Third Parties and Third Countries any Personal Data to the extent necessary or appropriate to facilitate the administration of the Plan or any other share incentive plan. You authorize the Company to store and transmit Personal Data in electronic form. You confirm that, to the extent such rights exist under applicable law, the Company has notified you of your rights of entitlement to reasonable access to the Personal Data and your rights to rectify any inaccuracies in that data. Any inquiries may be directed to the Company's General Counsel and Corporate Secretary.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date first written above.

TRONOX HOLDINGS PLC

By:__

Name: Jeffrey Neuman

Title: SVP, General Counsel & Secretary

PARTICIPANT

__

Name:__

Exhibit 10.31

RESTRICTED SHARE UNIT AGREEMENT
PURSUANT TO THE
AMENDED AND RESTATED
TRONOX HOLDINGS PLC
MANAGEMENT EQUITY INCENTIVE PLAN
PERFORMANCE-BASED RESTRICTED SHARE UNITS WITH TSR METRIC

*** * * * ***

Participant:

Grant Date: February 4, 2021

Vest Date: March 5, 2024 (or if this date is not a trading day on the NYSE, the next trading day)

Number of Restricted Share Units granted:

*** * * * ***

THIS RESTRICTED SHARE UNIT AWARD AGREEMENT (this "Agreement"), dated as of the Grant Date specified above, is entered into by and between Tronox Holdings plc (the "Company"), and the Participant specified above, pursuant to the Amended and Restated Tronox Holdings plc Management Equity Incentive Plan (the "Plan"), which is administered by the Committee; and

WHEREAS, it has been determined by the Committee under the Plan that it would be in the best interests of the Company to grant and issue the Restricted Share Units provided herein to the Participant on and subject to the terms and conditions of the Plan and this Agreement ("TSR RSUs").

NOW, THEREFORE, in consideration of the mutual covenants and promises hereinafter set forth and for other good and valuable consideration, the parties hereto hereby mutually covenant and agree as follows:

1. **Incorporation By Reference; Plan Document Receipt Certain Defined Terms**. This Agreement is an Award Agreement for the purpose of the Plan. This Agreement is subject in all respects to the terms and provisions of the Plan (including, without limitation, any amendments thereto adopted at any time and from time to time unless such amendments are expressly intended not to apply to the Award provided hereunder), all of which terms and provisions are made a part of and incorporated in this Agreement as if they were each expressly set forth herein. Any capitalized term not defined in this Agreement shall have the same meaning as is ascribed thereto in the Plan. The Participant hereby acknowledges receipt of a true copy of the Plan and that the Participant has read the Plan carefully and fully understands its

content. Unless otherwise provided herein, in the event of any conflict between the terms of this Agreement and the terms of the Plan, the terms of the Plan shall control.

2. **Grant of Restricted Share Unit Award**. The Company hereby grants to the Participant, as of the Grant Date specified above, on or as soon as practicable after the date of execution of this Agreement the number of TSR RSUs specified above. The Participant agrees and understands that except as provided by the Plan nothing contained in this Agreement provides, or is intended to provide, the Participant with any protection against potential future dilution of the Participant's interest in the Company for any reason and no adjustments shall be made for dividends in cash or other property, distributions or other rights in respect of any such shares, except as otherwise specifically provided for in the Plan or this Agreement. The Participant also agrees and understands that the TSR RSUs are not Shares and do not confer rights on the Participant as a Shareholder.

3. **Vesting**.

(a) Total Shareholder Return Vesting. Except as otherwise provided in this Section 3, the TSR RSUs subject to this Agreement shall vest based upon the Company's Total Shareholder Return over the Measurement Period. The "Measurement Period" shall mean the period commencing on the first day of the calendar quarter immediately preceding the Grant Date and ending on the last day of the calendar quarter immediately preceding the third (3rd) anniversary of the start of the Measurement Period.

(i)Subject to the Participant's continued employment on the Vest Date, the number of TSR RSUs that shall vest pursuant to this Section 3(a) shall be equal to the aggregate number of TSR RSUs multiplied by the applicable TSR Payout Percentage. The following table shall be used to determine the "TSR Payout Percentage":

Three-Year Total Shareholder Return Percentile Ranking	TSR Payout Percentage
65th percentile or higher (Maximum)	200%
50th percentile (Target)	100%
35th percentile (Threshold)	25%
Below 35th percentile	0%

To the extent that the Company's actual Total Shareholder Return percentile ranking for the Measurement Period hereunder is between the Threshold level and the Target level or between the Target level and the Maximum level, the number of TSR RSUs to become vested hereunder shall be determined on a pro rata basis using straight-line interpolation; provided that no TSR RSUs shall become vested if the actual Total Shareholder Return percentile ranking achieved for the Measurement Period is less than the Threshold level percentile ranking set forth in the table above; and provided, further, that the maximum number of TSR RSUs that may become vested shall not exceed the number of TSR RSUs set forth in the table above corresponding to the Maximum level performance ranking. To determine the TSR Payout Percentage, performance results and TSR Payout Percentage will be rounded up/down to the nearest tenth percent (e.g. 80.57% will be rounded to 80.6%). The final number of TSR RSUs will be determined by multiplying the TSR Payout Percentage by the number of TSR RSUs at target and rounding up/down to the nearest whole unit.

(ii)The percentile ranking of the "Total Shareholder Return" (defined as Share price appreciation plus dividends reinvested) shall be the Company's Total Shareholder Return for the Measurement Period as compared to the Total Shareholder Return for the companies, without replacement, which are set forth on Exhibit A hereto.

(iii)The Company's Total Shareholder Return shall be the Company's Total Shareholder Return for the Measurement Period calculated with dividends reinvested, for the Shares as reported on the applicable national exchanges on which the Shares are listed for trading and ending on the last day of the Measurement Period (or, if the Shares are not traded on that date, on the next preceding trading date on which the Shares are traded). For purposes of calculating Total Shareholder Return:

(1) The starting price for the Shares and the stock of each company in the Capital Markets Peer Group shall be the average of the closing price for each trading day within the thirty (30) trading days ending on the day before the first day of the Measurement Period; and

(2) The ending stock price for the Shares and the stock of each company in the Capital Markets Peer Group shall be the average of the closing prices for each trading day within the thirty (30) trading days ending on the last day of the Measurement Period.

(iv)In the event of an exchange, tender offer, merger, consolidation, recapitalization, split, combination or otherwise, the Committee may make appropriate adjustments to the applicable Total Shareholder Return performance metrics. The Committee's adjustment shall be made in accordance with the provisions of the Plan and shall be effective and final, binding and conclusive for all purposes of the Plan and this Agreement.

(b) Termination in General. Except as otherwise set forth in Sections 3(c), 3(d), 3(e), 3(f), and 3(g) hereof, all unvested TSR RSUs shall immediately be canceled and forfeited upon a Termination for any reason.

(c) Termination for Death or Disability. Upon a Participant's Termination due to the Participant's death or Disability, all unvested TSR RSUs shall immediately become vested assuming a TSR Payout Percentage of 100%.

(d) Termination for Normal Retirement. Upon a Participant's Termination due to the Participant's Normal Retirement before March 5, 2022, all unvested TSR RSUs shall immediately be canceled and forfeited. Upon a Participant's Termination due to the Participant's Normal Retirement on or after March 5, 2022, a pro rata portion of the unvested TSR RSUs that would have been eligible to vest on the Vest Date shall remain outstanding and be eligible to vest based upon the Company's actual performance over the Measurement Period in accordance with Sections 3(a) as applicable, in an amount determined by multiplying the number of TSR RSUs that were eligible to become vested on the Vest Date by a fraction, the numerator of which is the number of calendar days from the Grant Date to the date of Termination and the denominator of which is the number of calendar days from the Grant Date to the Vest Date. For purposes of this Agreement, "Retirement" shall mean a Termination other than a termination for Cause at or after age 65, or such earlier date after age 50 as may be approved by the Committee with regard to such Participant, in its sole discretion, subject to Section 409A of the Code.

(e) Termination without Cause. Upon a Participant's Termination by the Company without Cause before March 5, 2022, all unvested TSR RSUs shall immediately be canceled and forfeited. Upon a Participant's Termination by the Company without Cause on or after March 5, 2022, a pro rata portion of the unvested TSR RSUs that would have been eligible to vest on the Vest Date shall remain outstanding and be eligible to vest based upon the Company's actual performance over the Measurement Period in accordance with Section 3(a) in an amount determined by multiplying the number of TSR RSUs that were eligible to become vested on the Vest Date by a fraction, the numerator of which is the number of calendar days from the Grant Date to the date of Termination and the denominator of which is the number of calendar days from the Grant Date to the Vest Date.

(f) Change in Control. Except as otherwise provided in a Participant's employment agreement, if any, Section 12.1 of the Plan shall govern the treatment of the TSR RSUs in connection with a Change in Control.

(g) Committee Discretion to Accelerate Vesting. Notwithstanding the foregoing, the Committee may, in its sole discretion (but subject to applicable law), provide for accelerated vesting of the TSR RSUs at any time and for any reason.

4. **Delivery of Unrestricted Shares**. If and when TSR RSUs awarded by this Agreement become vested, the Units shall cease to be liable to be forfeited by the Participant. By no later than ten (10) days following the date on which any TSR RSUs awarded hereunder become vested the Company, subject to satisfaction of the tax withholding requirements under Section 10 below, shall (i) deliver to the Participant a certificate or book entry transfer for a number of unrestricted Shares equal to the total number of TSR RSUs that vested on such date and (ii) make a Dividend Equivalent Payment to the Participant with respect to TSR RSUs (excluding any TSR RSUs attributable to above target performance) as provided in Section 7.5.5(b) of the Plan.

5. **Dividends and Other Distributions; Voting Rights**.

(a) Section 7.5.5(b) of the Plan shall apply with respect to the TSR RSUs.

(b) Participants have no voting rights during period of restrictions for TSR RSUs.

(c) Section 7.5.6 of the Plan shall apply with respect to the TSR RSUs (unless the Committee determines otherwise in any particular case pursuant to Section 4.3 of the Plan).

6. **No transferability**. No TSR RSU granted hereunder may be sold, transferred, pledged, assigned or otherwise alienated or hypothecated.

7. **Entire Agreement; Amendment**. This Agreement, together with the Plan, contains the entire agreement between the parties hereto with respect to the subject matter contained herein, and supersedes all prior agreements or prior understandings, whether written or oral, between the parties relating to such subject matter. The Committee shall have the right, in its sole discretion, to modify or amend this Agreement from time to time in accordance with and as provided in the Plan. This Agreement may also be modified or amended by writing signed by both the Company and the Participant. The Company shall give written notice to the Participant of any such modification or amendment of this Agreement as soon as practicable after the adoption thereof.

8. **Acknowledgment of Participant**. This award of TSR RSUs does not entitle Participant to any benefit other than that granted under this Agreement. Any benefits granted under this Agreement are not part of the Participant's ordinary salary, and shall not be considered as part of such salary in the event of severance, redundancy or resignation. Participant understands and accepts that the benefits granted under this Agreement are entirely at the discretion of the Company and that the Company retains the right to amend or terminate this Agreement and the Plan at any time, at its sole discretion and without notice.

9. **Governing Law**. This Agreement shall be governed by and construed in accordance with the laws of the State of New York, without reference to the principles of conflict of laws thereof.

10. **Withholding of Tax**. As a condition to the distribution of Shares to the Participant, the Participant shall be required to pay in cash, or to make other arrangements satisfactory to the Company (including, without limitation, authorizing withholding from payroll and any other amounts payable to the Participant), the amount that is sufficient to satisfy any federal, provincial, state, local and foreign taxes of any kind (including, but not limited to, the Participant's FICA and SDI obligations) in any and all jurisdictions which the Company, in its sole discretion, deems necessary to comply with the Code and/or any other applicable law, rule or regulation with respect to the TSR RSUs. Unless the tax withholding obligations of the Company are satisfied, the Company shall have no obligation to issue a certificate or book-entry transfer for such Shares (except as required by applicable law). The Committee, in its sole discretion and pursuant to such procedures as it may specify from time to time, may permit the Participant to satisfy his or her tax obligations, in whole or in part by one or more of the following (without limitation): (a) paying cash, (b) electing to have the Company withhold otherwise deliverable Shares having a Fair Market Value equal to the amount required to be withheld in all jurisdictions or (c) selling a sufficient number of such Shares otherwise deliverable to Participant through such means as the Company may determine in its sole discretion (whether through a broker or otherwise) equal to the amount required to be withheld.

11. **Acceptance**. The Participant shall forfeit the TSR RSUs if the Participant does not execute this Agreement within a period of sixty (60) days from the date that the Participant receives this Agreement (or such other period as the Committee shall provide). The Participant

consents to receive such documents by electronic delivery through an on-line or electronic system established and maintained by the Company or another third party designated by the Company, including the acceptance of the Award and the execution of this Agreement through electronic signature, and participant agrees to be bound by such electronic acceptance and such electronic signature.

12. **Securities Representations**. The TSR RSUs are being issued to the Participant and this Agreement is being made by the Company in reliance upon the following express representations and warranties of the Participant. The Participant acknowledges, represents and warrants that:

(a) The Participant has been advised that the Participant may be an “affiliate” within the meaning of Rule 144 under the Securities Act and in this connection the Company is relying in part on the Participant’s representations set forth in this Section 12.

(b) If the Participant is deemed an affiliate within the meaning of Rule 144 of the Securities Act, the TSR RSUs must be held indefinitely unless an exemption from any applicable resale restrictions is available or the Company files an additional registration statement (or a “re-offer prospectus”) with regard to the TSR RSUs and the Company is under no obligation to register the TSR RSUs (or to file a “re-offer prospectus”).

(c) If the Participant is deemed an affiliate within the meaning of Rule 144 of the Securities Act, the Participant understands that (i) the exemption from registration under Rule 144 will not be available unless (A) a public trading market then exists for the Shares of the Company, (B) adequate information concerning the Company is then available to the public, and (C) other terms and conditions of Rule 144 or any exemption therefrom are complied with, and (ii) any sale of the vested TSR RSUs hereunder may be made only in limited amounts in accordance with the terms and conditions of Rule 144 or any exemption therefrom.

13. **No Right to Employment**. Any questions as to whether and when there has been a termination of such employment and the cause of such termination shall be determined in the sole discretion of the Committee. Nothing in this Agreement shall interfere with or limit in any way the right of the Company to terminate the Participant’s employment or service at any time, for any reason and with or without cause.

14. **Notices**. Any notice which may be required or permitted under this Agreement shall be in writing, and shall be delivered in person or via facsimile transmission, overnight courier service or certified mail, return receipt requested, postage prepaid, properly addressed as follows:

(a) If such notice is to the Company, to the attention of the General Counsel of the Company or Secretary of the Company at such other address as the Company, by notice to the Participant, shall designate in writing from time to time.

(b) If such notice is to the Participant, at his/her address as shown on the Company's records, or at such other address as the Participant, by notice to the Company, shall designate in writing from time to time.

15. **Compliance with Laws**. The issuance of the TSR RSUs pursuant to this Agreement shall be subject to, and shall comply with, any applicable requirements of any foreign and U.S. federal and state securities laws, rules and regulations (including, without limitation, the provisions of the Securities Act, the Exchange Act, the Corporations Act, and in each case any respective rules and regulations promulgated thereunder) and any other law or regulation applicable thereto. The Company shall not be obligated to issue the TSR RSUs or any of the Shares pursuant to this Agreement if any such issuance would violate any such requirements.

16. **Binding Agreement; Assignment**. This Agreement shall inure to the benefit of, be binding upon, and be enforceable by the Company and its successors and assigns. The Participant shall not assign (except as provided by Section 6 hereof) any part of this Agreement without the prior express written consent of the Company.

17. **Counterparts**. This Agreement may be executed in one or more counterparts, each of which shall be deemed to be an original, but all of which shall constitute one and the same instrument.

18. **Headings**. The titles and headings of the various sections of this Agreement have been inserted for convenience of reference only and shall not be deemed to be a part of this Agreement.

19. **Further Assurances**. Each party hereto shall do and perform (or shall cause to be done and performed) all such further acts and shall execute and deliver all such other agreements, certificates, instruments and documents as either party hereto reasonably may request in order to carry out the intent and accomplish the purposes of this Agreement and the Plan and the consummation of the transactions contemplated thereunder.

20. **Severability**. The invalidity or unenforceability of any provisions of this Agreement in any jurisdiction shall not affect the validity, legality or enforceability of the remainder of this Agreement in such jurisdiction or the validity, legality or enforceability of any provision of this Agreement in any other jurisdiction, it being intended that all rights and obligations of the parties hereunder shall be enforceable to the fullest extent permitted by law.

21. **Disclosure and Use of Information.** This Section 21 shall apply if you reside outside of the United States and its territories and only to the extent required by applicable law. You hereby acknowledge that the Company holds and processes information relating to your employment, including the nature and amount of your compensation, information relating to grants made by the Company to you under this Plan or other share incentive plans, your bank details, social security or national identity number, and other personal details ("Personal Data"). You further acknowledge that the Company is part of a group of companies operating internationally, and that, in connection with the Plan or other share incentive plans, it may be necessary for the Company to make Personal Data available to its subsidiaries and affiliates, to

third-party advisors and administrators of any share incentive plans or arrangements, to service providers and other third parties in the ordinary course of business, and to regulatory authorities and tribunals (the “Third Parties”); and that these Third Parties may be located in countries other than your country of residence (the “Third Countries”), including the United States and other countries outside the European Economic Area. You acknowledge that the laws of these Third Counties may not provide for the level of data protection equivalent to that provided for in your country of residence. Any Personal Data made available by the Company as described above in relation to the Plan or any share incentive plan will be for the purpose of administration and management of the Plan or any other share incentive plan of the Company, on behalf of the Company, or as otherwise permitted or required by law. You hereby authorize the Company to hold and process the Personal Data for these purposes, and to transfer to the Third Parties and Third Countries any Personal Data to the extent necessary or appropriate to facilitate the administration of the Plan or any other share incentive plan. You authorize the Company to store and transmit Personal Data in electronic form. You confirm that, to the extent such rights exist under applicable law, the Company has notified you of your rights of entitlement to reasonable access to the Personal Data and your rights to rectify any inaccuracies in that data. Any inquiries may be directed to the Company’s General Counsel and Corporate Secretary.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date first written above.

TRONOX HOLDINGS PLC

By:__

Name: Jeffrey Neuman

Title: SVP, General Counsel & Secretary

PARTICIPANT

__

Name:__

EXHIBIT A
Capital Markets Peer Group

	Company Name	Stock Exchange/Ticker
1	Cabot Corporation	NYSE/CBT
2	Ferro Corporation	NYSE/FOE
3	GCP Applied Technologies Inc.	NYSE/GCP
4	H.B. Fuller Company	NYSE/FUL
5	Iluka Resources Limited	ASX/ILU.AX
6	Koppers Holdings Inc.	NYSE/KOP
7	Kraton Corporation	NYSE/KRA
8	Kronos Worldwide, Inc.	NYSE/KRO
9	Minerals Technologies Inc.	NYSE/MTX
10	Orion Engineered Carbons, S.A.	NYSE/OEC
11	Quaker Chemical Corporation	NYSE/KWR
12	Rayonier Advanced Materials Inc.	NYSE/RYAM
13	Synthomer plc	LSE/SYNT.L
14	The Chemours Company	NYSE/CC
15	U.S. Silica Holdings, Inc.	NYSE/SLCA
16	Venator Materials PLC	NYSE/VNTR

Exhibit 21.1

LIST OF TRONOX HOLDINGS PLC SUBSIDIARIES

Subsidiary	Jurisdiction of Incorporation or Organization
Cristal Metals, LLC	Delaware
Hawkins Point LLC	Delaware
Tronox Finance LLC	Delaware
Tronox Incorporated	Delaware
Tronox LLC	Delaware
Tronox Pigments LLC	Delaware
Tronox US Holdings Inc.	Delaware
Non-U.S. Subsidiaries:	
CIC Switzerland	Switzerland
Hong Kong Titanium Products Company Limited	Hong Kong
Jiangxi Tikon Titanium Products Co. Ltd.	China
Millennium Inorganic Chemicals Holdings Brasil Ltda.	Brazil
Millennium Inorganic Chemicals Le Havre SAS	France
Millennium Inorganic Chemicals Overseas Holdings	United Kingdom
Millennium Inorganic Chemicals SAS	France
Millennium Inorganic Chemicals UK Holdings Limited	United Kingdom
Shanghai Millenium Chemicals Trading Ltd.	China
Tronox Australind Pty	Australia
Tronox Belgium BVBA	Belgium
Tronox Finance PLC	United Kingdom

Tronox France SaS	France
Tronox Global Holdings Pty Limited	Australia
Tronox Holdings Cooperatief U.A.	The Netherlands
Tronox Holdings Europe C.V.	The Netherlands
Tronox India Private Limited	India
Tronox International BV	Netherlands
Tronox International Finance LLP	United Kingdom
Tronox International Holdings GmbH	Switzerland
Tronox Investment Holdings Limited	United Kingdom
Tronox Investments Netherlands BV	Netherlands
Tronox Investments UK Limited	United Kingdom
Tronox KZN Sands (Pty) Ltd	South Africa
Tronox Limited	Australia
Tronox Management Pty Ltd.	Australia
Tronox Mineral Holdings Australia Pty Ltd	Australia
Tronox Mineral Sands (Pty) Ltd	South Africa
Tronox Mining Australia Limited	Australia
Tronox Pigment Bunbury Ltd	Australia
Tronox Pigment UK Limited	United Kingdom
Tronox Pigmentos do Brasil SA	Brazil
Tronox Pigments (Holland) B.V.	Netherlands
Tronox Pigments (Netherlands) B.V.	Netherlands

Tronox Pigments Pty Limited	Australia
Tronox Pigments (Singapore) Pte. Ltd.	Singapore
Tronox Sands Holdings Pty Limited	Australia
Tronox Saudi Industries Company	Kingdom of Saudi Arabia
Tronox UK Holdings Limited	United Kingdom
Tronox UK Merger Company Limited	United Kingdom

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (No. 333-240322) and Form S-3 (No. 333-237838) of Tronox Holdings plc of our report dated February 23, 2021 relating to the financial statements and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/PricewaterhouseCoopers LLP

Stamford, Connecticut
February 23, 2021

Exhibit 24.0

POWER OF ATTORNEY

Each of the undersigned, as a director of Tronox Holdings plc (the “Company”), a public limited company registered under the laws of England and Wales, hereby appoints Timothy Carlson, Jeffrey Neuman and Steven Kaye, each with power to act without the other and with power of substitution and resubstitution, as my attorney-in-fact and agent for me and in my name, place and stead in any and all capacities,

(i) to sign the Company’s Annual Report on Form 10-K under the Securities Exchange Act of 1934 for the year ended December 31, 2020,

(ii) to sign any amendment to the Annual Report referred to in (i) above, or to any previously filed Annual Report on Form 10-K for any prior fiscal year, and

(iii) to file the documents described in (i) and (ii) above and all exhibits thereto and any and all other documents in connection therewith,

granting unto each said attorney-in-fact and agent full power and authority to do and perform every act and thing requisite, necessary or desirable to be done in connection therewith, as fully to all intents and purposes as I might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any of them, or their or his or her substitutes or substitute, may lawfully do or cause to be done by virtue hereof.

This Power of Attorney may be signed in any number of counterparts, each of which shall be an original, with the same effect as if the signatures thereto and hereto were upon the same instrument.

Dated: February 5, 2021

[SIGNATURE PAGE TO FOLLOW]

/s/ Ilan Kaufthal

Ilan Kaufthal

/s/ Peter Johnston

Peter Johnston

/s/ Ginger Jones

Ginger Jones

/s/ Sipho Nkosi

Sipho Nkosi

/s/ Vanessa Guthrie

Vanessa Guthrie

/s/ Stephen Jones

Stephen Jones

/s/ Mutlaq H. Al-Morished

Mutlaq H. Al-Morished

/s/ Moazzam A. Khan

Moazzam A. Khan

Exhibit 31.1

**CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER
PURSUANT TO
EXCHANGE ACT RULE 13A-14(A)/15D-14(A)
AS ADOPTED PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, John Romano, certify that:

1. I have reviewed this Annual Report on Form 10-K for the year ended December 31, 2020 of Tronox Holdings plc (the “Registrant”);
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the Registrant as of, and for, the periods presented in this report;
4. The Registrant’s other certifying officers and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the Registrant and have:
    (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the Registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

    (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

    (c) Evaluated the effectiveness of the Registrant’s disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

    (d) Disclosed in this report any change in the Registrant’s internal control over financial reporting that occurred during the Registrant’s most recent fiscal quarter (the Registrant’s fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the Registrant’s internal control over financial reporting; and
5. The Registrant’s other certifying officers and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the Registrant’s auditors and the audit committee of the Registrant’s board of directors (or persons performing the equivalent functions):
    (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the Registrant’s ability to record, process, summarize and report financial information; and

    (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the Registrant’s internal control over financial reporting.

Date: February 23, 2021

/s/ JOHN ROMANO

John Romano

Interim Co-Chief Executive Officer

Exhibit 31.2

**CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER
PURSUANT TO
EXCHANGE ACT RULE 13A-14(A)/15D-14(A)
AS ADOPTED PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Jean-Francois Turgeon, certify that:

1. I have reviewed this Annual Report on Form 10-K for the year ended December 31, 2020 of Tronox Holdings plc (the "Registrant");
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the Registrant as of, and for, the periods presented in this report;
4. The Registrant's other certifying officers and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the Registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the Registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the Registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the Registrant's internal control over financial reporting that occurred during the Registrant's most recent fiscal quarter (the Registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the Registrant's internal control over financial reporting; and
5. The Registrant's other certifying officers and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the Registrant's auditors and the audit committee of the Registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the Registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the Registrant's internal control over financial reporting.

Date: February 23, 2021

/s/ JEAN-FRANCOIS TURGEON

Jean-Francois Turgeon

Interim Co-Chief Executive Officer

Exhibit 31.3

**CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER
PURSUANT TO
EXCHANGE ACT RULE 13A-14(A)/15D-14(A)
AS ADOPTED PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Timothy Carlson, certify that:

1. I have reviewed this Annual Report on Form 10-K for the year ended December 31, 2020 of Tronox Holdings plc (the "Registrant");
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the Registrant as of, and for, the periods presented in this report;
4. The Registrant's other certifying officers and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the Registrant and have:
   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the Registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
   (c) Evaluated the effectiveness of the Registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
   (d) Disclosed in this report any change in the Registrant's internal control over financial reporting that occurred during the Registrant's most recent fiscal quarter (the Registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the Registrant's internal control over financial reporting; and
5. The Registrant's other certifying officers and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the Registrant's auditors and the audit committee of the Registrant's board of directors (or persons performing the equivalent functions):
   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the Registrant's ability to record, process, summarize and report financial information; and
   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the Registrant's internal control over financial reporting.

Date: February 23, 2021

/s/ TIMOTHY CARLSON

Timothy Carlson

Senior Vice President and Chief Financial Officer

Exhibit 32.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER
PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

Pursuant to 18 U.S.C § 1350, the undersigned officer of Tronox Holdings plc (the “Registrant”) hereby certifies that the Registrant’s Annual Report on Form 10-K for the year ended December 31, 2020 (the “Report”) fully complies with the requirements of Section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934 and that the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Registrant.

February 23, 2021

/s/ JOHN ROMANO
John Romano
Interim Co-Chief Executive Officer

The foregoing certification is being furnished solely pursuant to 18 U.S.C. § 1350 and is not being filed as part of the Report or as a separate disclosure document.

Exhibit 32.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER
PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

Pursuant to 18 U.S.C. § 1350, the undersigned officer of Tronox Holdings plc (the “Registrant”) hereby certifies that the Registrant’s Annual Report on Form 10-K for the year ended December 31, 2020 (the “Report”) fully complies with the requirements of Section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934 and that the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Registrant.

February 23, 2021

/s/ JEAN-FRANCOIS TURGEON

Jean-Francois Turgeon

Interim Co-Chief Executive Officer

The foregoing certification is being furnished solely pursuant to 18 U.S.C. § 1350 and is not being filed as part of the Report or as a separate disclosure document.

Exhibit 32.3

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER
PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

Pursuant to 18 U.S.C § 1350, the undersigned officer of Tronox Holdings plc (the “Registrant”) hereby certifies that the Registrant’s Annual Report on Form 10-K for the year ended December 31, 2020 (the “Report”) fully complies with the requirements of Section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934 and that the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Registrant.

February 23, 2021

/s/ TIMOTHY CARLSON
Timothy Carlson
Senior Vice President and Chief Financial Officer

The foregoing certification is being furnished solely pursuant to 18 U.S.C. § 1350 and is not being filed as part of the Report or as a separate disclosure document.