

FERRO CORP  
Form 10-K  
February 24, 2016  
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UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

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Form 10-K

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934  
For the fiscal year ended December 31, 2015

or

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF  
1934  
For the transition period from \_\_\_\_\_ to \_\_\_\_\_

Commission file number 1-584

FERRO CORPORATION

(Exact name of registrant as specified in its charter)

Ohio  
(State of Corporation)  
6060 Parkland Blvd.

34-0217820  
(IRS Employer Identification No.)

Suite 250

Mayfield Heights, OH

44124

(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code: 216-875-5600

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Securities Registered Pursuant to section 12(b) of the Act:

| Title of Each Class            | Name of Each Exchange on Which Registered |
|--------------------------------|---|
| Common Stock, par value \$1.00 | New York Stock Exchange                   |

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 Section 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 and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted 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 and post such files). YES NO

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained here, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer Accelerated filer Non-accelerated filer Smaller reporting company

(Do not check if a smaller reporting company)

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). YES NO

The aggregate market value of Ferro Corporation Common Stock, par value \$1.00, held by non-affiliates and based on the closing sale price as of June 30, 2015, was approximately \$1,444,390,000.

On January 31, 2016, there were 82,893,768 shares of Ferro Corporation Common Stock, par value \$1.00 outstanding.

#### DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Proxy Statement for Ferro Corporation's 2016 Annual Meeting of Shareholders are incorporated into Part III of this Annual Report on Form 10-K.



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PART I

Item 1 — Business

History, Organization and Products

Ferro Corporation was incorporated in Ohio in 1919 as an enameling company. When we use the terms “Ferro,” “we,” “us” or “the Company,” we are referring to Ferro Corporation and its subsidiaries unless we indicate otherwise. Today, we are a leading producer of specialty materials that are sold to a broad range of manufacturers who, in turn, make products for many end-use markets. We operate approximately 36 facilities around the world that manufacture the following types of performance materials:

- Frits, porcelain and other glass enamels, glazes, stains, decorating colors, pigments, inks, polishing materials, specialty dielectrics, electronic glasses, and other specialty coatings.

We refer to our products as performance materials because we formulate them to perform specific functions in the manufacturing processes and end products of our customers. The products we develop often are delivered to our customers in combination with customized technical service. The value of our products stems from the benefits they deliver in actual use. We develop and deliver innovative products to our customers through our key strengths in:

- Particle Engineering — Our ability to design and produce very small particles made of a broad variety of materials, with precisely controlled characteristics of shape, size and size distribution. We understand how to disperse these particles within liquid, paste and gel formulations.
- Color and Glass Science — Our understanding of the chemistry required to develop and produce pigments that provide color characteristics ideally suited to customers’ applications. We have a demonstrated ability to provide glass-based coatings with properties that precisely meet customers’ needs in a broad variety of applications.
- Surface Chemistry and Surface Application Technology — Our understanding of chemicals and materials used to develop products and processes that involve the interface between layers and the surface properties of materials.
- Product Formulation — Our ability to develop and manufacture combinations of materials that deliver specific performance characteristics designed to work within customers’ particular products and manufacturing processes.

We deliver these key technical strengths to our customers in a way that creates additional value through our integrated applications support. Our applications support personnel provide assistance to our customers in their material specification and evaluation, product design and manufacturing process characterization in order to help them optimize the efficient and cost-effective application of our products.

We divide our operations into four business units, which comprise three reportable segments listed below:

Tile Coating Systems(1)  
Porcelain Enamel(1)  
Performance Colors and Glass  
Pigments, Powders and Oxides

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(1) Tile Coating Systems and Porcelain Enamel are combined into one reportable segment, Performance Coatings, for financial reporting purposes.

Financial information about our segments is included herein in Note 20 to the consolidated financial statements under Item 8 of this Annual Report on Form 10-K.



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### Markets and Customers

Ferro's products are used in a variety of product applications in markets including:

|                         |                       |
|-------------------------|-----------------------|
| Appliances              | Household furnishings |
| Automobiles             | Industrial products   |
| Building and renovation | Packaging             |
| Electronics             |                       |

Many of our products are used as coatings on our customers' products, such as glazes and decorations on tile, glass and dinnerware. Other products are supplied to customers as powders that are used to manufacture electronic components and other products. Still other products are added during our customers' manufacturing processes to provide desirable properties to their end product. Often, our products are a small portion of the total cost of our customers' products, but they can be critical to the appearance or functionality of those products.

Our customers include manufacturers of ceramic tile, major appliances, construction materials, automobile parts, automobile, architectural and container glass, and electronic components and devices. Many of our customers, including makers of major appliances and automobile parts, purchase materials from more than one of our business units. Our customer base is well diversified both geographically and by end market.

We generally sell our products directly to our customers. However, a portion of our business uses indirect sales channels, such as agents and distributors, to deliver products to market. In 2015, no single customer or related group of customers represented more than 10% of net sales. In addition, none of our reportable segments is dependent on any single customer or related group of customers.

### Backlog of Orders and Seasonality

Generally, there is no significant lead time between customer orders and delivery in any of our business segments. As a result, we do not consider that the dollar amount of backlogged orders believed to be firm is material information for an understanding of our business. We also do not regard any material part of our business to be seasonal. However, customer demand has historically been higher in the second quarter when building and renovation markets are particularly active, and this quarter is normally the strongest for sales and operating profit.

### Competition

In most of our markets, we have a substantial number of competitors, none of which is dominant. Due to the diverse nature of our product lines, no single competitor directly matches all of our product offerings. Our competition varies by product and by region, and is based primarily on price, product quality and performance, customer service and technical support, and our ability to develop custom products to meet specific customer requirements.

We are a worldwide leader in the production of glass enamels, porcelain enamels, and ceramic tile coatings. There is strong competition in our markets, ranging from large multinational corporations to local producers. While many of our customers purchase customized products and formulations from us, our customers could generally buy from other sources, if necessary.

Raw Materials and Supplier Relations

Raw materials widely used in our operations include:

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Metal Oxides:

Aluminum oxide(1)  
 Cobalt oxide(1)(2)  
 Nickel oxide(1)(2)  
 Titanium dioxide(1)(2)  
 Zinc oxide(2)  
 Zirconium dioxide(2)

Other Inorganic Materials:

Boron acid(2)  
 Clay(2)  
 Feldspar(2)  
 Lithium(2)  
 Silica(2)  
 Zircon(2)

Precious and Non-precious Metals:

Bismuth(1)  
 Chrome(1)(2)  
 Copper(1)  
 Gold(1)  
 Silver(1)

Energy:

Electricity  
 Natural gas

(1) Primarily used by Performance Colors and Glass and Pigments, Powders and Oxides.

(2) Primarily used by Performance Coatings.

These raw materials make up a large portion of our product costs in certain of our product lines, and fluctuations in the cost of raw materials can have a significant impact on the financial performance of the related businesses. We attempt to pass through to our customers raw material cost increases.

We have a broad supplier base and, in many instances, multiple sources of essential raw materials are available worldwide if problems arise with a particular supplier. We maintain many comprehensive supplier agreements for strategic and critical raw materials. We did not encounter raw material shortages in 2015 that significantly affected our manufacturing operations, but we are subject to volatile raw material costs that can affect our results of operations.

Environmental Matters

As part of the production of some of our products, we handle, process, use and store hazardous materials. As a result, we operate manufacturing facilities that are subject to a broad array of environmental laws and regulations in the countries in which we operate, particularly for plant wastes and emissions. In addition, some of our products are subject to restrictions under laws or regulations such as California's Proposition 65 or the European Union's ("EU") chemical substances directive. The costs to comply with complex environmental laws and regulations are significant and will continue for the industry and us for the foreseeable future. These routine costs are expensed as they are incurred. While these costs may increase in the future, they are not expected to have a material impact on our financial position, liquidity or results of operations. We believe that we are in substantial compliance with the environmental regulations to which our operations are subject and that, to the extent we may not be in compliance with such

regulations, non-compliance will not have a materially adverse effect on our financial position, liquidity or results of operations.

Our policy is to operate our plants and facilities in a manner that protects the environment and the health and safety of our employees and the public. We intend to continue to make expenditures for environmental protection and improvements in a timely manner consistent with available technology. Although we cannot precisely predict future environmental spending, we do not expect the costs to have a material impact on our financial position, liquidity or results of operations. Capital expenditures for environmental protection were \$5.5 million in 2015, \$0.7 million in 2014, and \$2.5 million in 2013. We also accrue for environmental remediation

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costs when it is probable that a liability has been incurred and we can reasonably estimate the amount. We determine the timing and amount of any liability based upon assumptions regarding future events, and inherent uncertainties exist in such evaluations primarily due to unknown conditions, changing governmental regulations and legal standards regarding liability, and evolving technologies. We adjust these liabilities periodically as remediation efforts progress, the nature and extent of contamination becomes more certain, or as additional technical or legal information becomes available.

### Research and Development

We are involved worldwide in research and development activities relating to new and existing products, services and technologies required by our customers' continually changing markets. Our research and development resources are organized into centers of excellence that support our regional and worldwide major business units. These centers are augmented by local laboratories that provide technical service and support to meet customer and market needs in various geographic areas.

Total expenditures for product and application technology, including research and development, customer technical support and other related activities, were \$25.6 million in 2015, \$22.7 million in 2014, and \$25.9 million in 2013.

### Patents, Trademarks and Licenses

We own a substantial number of patents and patent applications relating to our various products and their uses. While these patents are of importance to us and we exercise diligence to ensure that they are valid, we do not believe that the invalidity or expiration of any single patent or group of patents would have a material adverse effect on our businesses. Our patents will expire at various dates through the year 2034. We also use a number of trademarks that are important to our businesses as a whole or to particular segments of our business. We believe that these trademarks are adequately protected.

### Employees

At December 31, 2015, we employed 4,846 full-time employees, including 4,108 employees in our foreign consolidated subsidiaries and 738 in the United States ("U.S."). Total employment increased by 846 in our foreign subsidiaries and by 21 in the U.S. from the prior year end due to the additions related to acquisitions and new business opportunities net effect of cost reduction initiatives and the sale of our Venezuela joint venture.

Collective bargaining agreements cover 13% of our U.S. workforce. None of our U.S. labor agreements expire in 2016. We consider our relations with our employees, including those covered by collective bargaining agreements, to be good.

Our employees in Europe have protections afforded them by local laws and regulations through unions and works councils. Some of these laws and regulations may affect the timing, amount and nature of restructuring and cost reduction programs in that region.

### Domestic and Foreign Operations

We began international operations in 1927. Our products are manufactured and/or distributed through our consolidated subsidiaries and unconsolidated affiliates in the following countries:



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Consolidated Subsidiaries:

|           |           |             |                |
|-----------|-----------|-------------|----------------|
| Argentina | Egypt     | Luxembourg  | Spain          |
| Australia | France    | Malaysia    | Taiwan         |
| Belgium   | Germany   | Mexico      | Thailand       |
| Brazil    | India     | Netherlands | United Kingdom |
| Bulgaria  | Indonesia | Poland      | United States  |
| Canada    | Ireland   | Portugal    | Turkey         |
| China     | Italy     | Romania     |                |
| Colombia  | Japan     | Russia      |                |

Unconsolidated Affiliates:

|         |           |       |             |
|---------|-----------|-------|-------------|
| Ecuador | Indonesia | Spain | South Korea |
| Egypt   | Italy     |       |             |

Financial information for geographic areas is included in Note 20 to the consolidated financial statements under Item 8 of this Annual Report on Form 10-K. More than 70% of our net sales are outside of the U.S. Our customers represent more than 30 industries and operate in approximately 100 countries.

Our U.S. parent company receives technical service fees and/or royalties from many of its foreign subsidiaries. As a matter of corporate policy, the foreign subsidiaries have historically been expected to remit a portion of their annual earnings to the U.S. parent company as dividends. To the extent earnings of foreign subsidiaries are not remitted to the U.S. parent company, those earnings are indefinitely re-invested in those subsidiaries.

Available Information

Our Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, and Current Reports on Form 8-K, including any amendments, will be made available free of charge on our Web site, [www.ferro.com](http://www.ferro.com), as soon as reasonably practical, following the filing of the reports with the U.S. Securities and Exchange Commission (“SEC”). Our Corporate Governance Principles, Legal and Ethical Policies, Guidelines for Determining Director Independence, and charters for our Audit Committee, Compensation Committee and Governance and Nomination Committee are available free of charge on our Web site or to any shareholder who requests them from the Ferro Corporation Investor Relations Department located at 6060 Parkland Blvd., Suite 250, Mayfield Heights, Ohio, 44124.

Forward-looking Statements

Certain statements contained here and in future filings with the SEC reflect our expectations with respect to future performance and constitute “forward-looking statements” within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. These statements are subject to a variety of uncertainties, unknown risks and other factors concerning our operations and the business environment, which are difficult to predict and are beyond our control.

#### Item 1A — Risk Factors

Many factors could cause our actual results to differ materially from those suggested by statements contained in this filing and could adversely affect our future financial performance. Such factors include the following:

We sell our products into industries where demand has been unpredictable, cyclical or heavily influenced by consumer spending, and such demand and our results of operations may be further impacted by macro-economic circumstances.

We sell our products to a wide variety of customers who supply many different market segments. Many of these market segments, such as building and renovation, major appliances, transportation, and electronics, are cyclical or closely tied to consumer demand. Consumer demand is difficult to accurately forecast and incorrect forecasts of demand or unforeseen reductions in demand can adversely

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affect costs and profitability due to factors such as underused manufacturing capacity, excess inventory, or working capital needs. Our forecasting systems and modeling tools may not accurately predict changes in demand for our products or other market conditions.

Our results of operations are materially affected by conditions in capital markets and economies in the U.S. and elsewhere around the world. Concerns over fluctuating prices, energy costs, geopolitical issues, government deficits and debt loads, and the availability and cost of credit have contributed to economic uncertainty around the world. Our customers may be impacted by these conditions and may modify, delay, or cancel plans to purchase our products. Additionally, if customers are not successful in generating sufficient revenue or are precluded from securing financing, they may not be able to pay, or may delay payment of, accounts receivable that are owed to us. A reduction in demand or inability of customers to pay us for our products may adversely affect our earnings and cash flow.

We strive to improve operating margins through sales growth, price increases, productivity gains, and improved purchasing techniques, but we may not achieve the desired improvements.

We work to improve operating profit margins through activities such as growing sales to achieve increased economies of scale, increasing prices, improving manufacturing processes, and adopting purchasing techniques that lower costs or provide increased cost predictability to realize cost savings. However, these activities depend on a combination of improved product design and engineering, effective manufacturing process control initiatives, cost-effective redistribution of production, and other efforts that may not be as successful as anticipated. The success of sales growth and price increases depends not only on our actions but also on the strength of customer demand and competitors' pricing responses, which are not fully predictable. Failure to successfully implement actions to improve operating margins could adversely affect our financial performance.

The global scope of our operations exposes us to risks related to currency conversion rates, new and different regulatory schemes and changing economic, regulatory, social and political conditions around the world.

More than 70% of our net sales during 2015 were outside of the U.S. In order to support global customers, access regional markets and compete effectively, our operations are located around the world. Our operations are subject to economic, regulatory, social and political conditions in multiple locations and we are subject to risks relating to currency conversion rates. We also may encounter difficulties expanding into additional growth markets around the world. Other risks inherent in international operations include the following:

- New and different legal and regulatory requirements and enforcement mechanisms in local jurisdictions;
- U.S. and other export licenses may be difficult to obtain and we may be subject to export duties or import quotas or other trade restrictions or barriers;
- Increased costs, and decreased availability, of transportation or shipping;
- Credit risk and financial conditions of local customers and distributors;
- Risk of nationalization of private enterprises by foreign governments or restrictions on investments;
- Potentially adverse tax consequences, including imposition or increase of withholding and other taxes on remittances and other payments by subsidiaries; and
  - Local political, economic and social conditions, including the possibility of hyperinflationary conditions, deflation, and political instability in certain countries.

We have subsidiaries in Turkey and in Egypt, countries with recent political strains that are located near politically volatile regions. Such conditions could potentially impact our ability to recover both the cost of our investments and

earnings from those investments. While we attempt to anticipate these changes and manage our business appropriately in each location where we do business, these changes are often beyond our control and difficult to forecast.

The consequences of these risks may have significant adverse effects on our results of operations or financial position, and if we fail to comply with applicable laws and regulations, we could be exposed to civil and criminal penalties, reputational harm, and restrictions on our operations.

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We have a presence in regions of the world where it can be difficult for a multi-national company such as Ferro to compete lawfully with local competitors, which may cause us to lose business opportunities.

We pursue business opportunities around the world and many of our most promising growth opportunities are in developing markets and the Asia-Pacific region, including Latin America and the People's Republic of China. Although we have been able to compete successfully in those markets to date, local laws and customs can make it difficult for a multi-national company such as Ferro to compete on a “level playing field” with local competitors without engaging in conduct that would be illegal under U.S. or other countries' anti-bribery laws. Our strict policy of observing the highest standards of legal and ethical conduct may cause us to lose some otherwise attractive business opportunities to competitors in these regions.

Our businesses depend on a continuous stream of new products, and failure to introduce new products could affect our sales, profitability and liquidity.

One way that we remain competitive is by developing and introducing new and improved products on an ongoing basis. Customers continually evaluate our products in comparison to those offered by our competitors. A failure to introduce new products at the right time that are price competitive and that provide the performance and other features required by customers could adversely affect our sales, or could require us to compensate by lowering prices. In addition, when we invest in new product development, we face risks related to production delays, cost over-runs and unanticipated technical difficulties, which could impact sales, profitability and/or liquidity.

We may not be able to complete or successfully integrate future acquisitions into our business, which could adversely affect our business or results of operations.

As part of our strategy, we intend to pursue acquisitions. Our success in accomplishing growth through acquisitions may be limited by the availability and suitability of acquisition candidates and by our financial resources, including available cash and borrowing capacity. Acquisitions involve numerous risks, including difficulty determining appropriate valuation, integrating operations, technologies, services and products of the acquired product lines or businesses, personnel turnover, and the diversion of management's attention from other business matters. In addition, we may be unable to achieve anticipated benefits from these acquisitions in the time frame that we anticipate, or at all, which could adversely affect our business or results of operations.

Our strategy includes seeking opportunities in new growth markets, and failure to identify or successfully enter such markets could affect our ability to grow our revenues and earnings.

Certain of our products are sold into mature markets and part of our strategy is to identify and enter into markets growing more rapidly. These growth opportunities may involve new geographies, new product lines, new technologies, or new customers. We may not be successful capitalizing on such opportunities and our ability to increase our revenue and earnings could be impacted.

We have undertaken cost-savings initiatives, including restructuring programs, to improve our operating performance, but we may not be able to implement and/or administer these initiatives in the manner contemplated and these initiatives may not produce the desired results.

We have undertaken cost-savings initiatives, including restructuring programs, and may undertake additional cost-savings initiatives in the future. These initiatives involve, among other things, restructuring programs that involve plant closures and staff reductions. Although we expect these initiatives to help us achieve incremental cost savings and operational efficiencies, we may not be able to implement and/or administer these initiatives, including plant closures and staff reductions, in the manner contemplated, which could cause the initiatives to fail to achieve the desired results. Additionally, the implementation of these initiatives may result in impairment charges, some of which could be material. Even if we do implement and administer these initiatives in the manner contemplated, they may not produce the desired results. Accordingly, the initiatives that we have implemented and those that we may

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implement in the future may not improve our operating performance and may not help us achieve cost savings. Failure to successfully implement and/or administer these initiatives could have an adverse effect on our financial performance.

We rely on information systems to conduct our business and interruption, or damage to, or failure or compromise of, these systems may adversely affect our business and results of operations.

We rely on information systems to obtain, process, analyze and manage data to forecast and facilitate the purchase and distribution of our products; to receive, process, and ship orders on a timely basis; to account for other product and service transactions with customers; to manage the accurate billing and collections for thousands of customers; to process payments to suppliers; and to manage data and records relating to our employees, contractors, and other individuals. Our business and results of operations may be adversely affected if these systems are interrupted, damaged, or compromised or if they fail for any extended period of time, due to events including but not limited to programming errors, computer viruses and security breaches. Information privacy and security risks have generally increased in recent years because of the proliferation of new technologies and the increased sophistication and activities of perpetrators of cyber-attacks, and prevention of privacy or security breaches cannot be assured. In addition, the processing and storage of certain information is increasingly subject to privacy and data security regulations and such regulations are country-specific and subject to differing interpretations and may be inconsistent among jurisdictions. We may be required to expend additional resources to continue to enhance our information privacy and security measures, investigate and remediate any information security vulnerabilities and/or comply with regulatory requirements. In addition, third-party service providers are responsible for managing a significant portion of our information systems, and we are subject to risk as a result of possible information privacy and security breaches of those third parties. The consequences of these risks could adversely impact our results of operations, financial condition, and cash flows.

We are subject to a number of restrictive covenants under our revolving credit facility, which could affect our flexibility to fund ongoing operations and strategic initiatives, and, if we are unable to maintain compliance with such covenants, could lead to significant challenges in meeting our liquidity requirements.

Our Credit Facility contains a number of restrictive covenants, including those described in more detail in Note 8 to the consolidated financial statements under Item 8 of this Annual Report on Form 10-K. These covenants include limitations on use of loan proceeds, limitations on the Company's ability to pay dividends and repurchase stock, limitations on acquisitions and dispositions and limitations on certain types of investments. The Credit Facility also contains standard provisions relating to conditions of borrowing and customary events of default, including the non-payment of obligations by the Company and the bankruptcy of the Company. Specific to the revolving credit facility, the Company is subject to financial covenants regarding the Company's outstanding net indebtedness and interest coverage ratios. If an event of default occurs, all amounts outstanding under the Credit Facility may be accelerated and become immediately due and payable. The Credit Facility is described in more detail in "Capital Resources and Liquidity" under Item 7 and in Note 8 to the consolidated financial statements under Item 8 of this Annual Report on Form 10-K.

The most critical of these ratios is the leverage ratio. As of December 31, 2015, we were in compliance with our maximum leverage ratio covenant of 3.75x as our actual ratio was 3.07x, providing \$28.2 million of EBITDA cushion on the leverage ratio, as defined within our credit facility. To the extent that economic conditions in key markets deteriorate or we are unable to meet our business projections and EBITDA falls below approximately \$130 million for

a rolling four quarters, based on reasonably consistent debt levels with those as of December 31, 2015, we could be unable to maintain compliance with our leverage ratio covenant, in which case, our lenders could demand immediate payment of outstanding amounts and we would need to seek alternate financing sources to pay off such debts and to fund our ongoing operations. Such financing may not be available on favorable terms, if at all.

We depend on external financial resources, and the economic environment and credit market uncertainty could interrupt our access to capital markets, borrowings, or financial transactions to hedge certain risks, which could adversely affect our financial condition.

At December 31, 2015, we had approximately \$473.6 million of short-term and long-term debt with varying maturities and approximately \$28.6 million of off balance sheet arrangements, including consignment arrangements for precious metals, bank guarantees, and standby letters of credit. These arrangements have allowed us to make investments in growth opportunities and fund working capital requirements. In addition, we may enter into financial transactions to hedge certain risks, including foreign exchange, commodity pricing, and sourcing of certain raw materials. Our continued access to capital markets, the stability of our lenders, customers

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and financial partners and their willingness to support our needs are essential to our liquidity and our ability to meet our current obligations and to fund operations and our strategic initiatives. An interruption in our access to external financing or financial transactions to hedge risk could adversely affect our business prospects and financial condition. See further information regarding our liquidity in “Capital Resources and Liquidity” under Item 7 and in Note 8 to the consolidated financial statements under Item 8 of this Annual Report on Form 10 K.

We depend on reliable sources of energy and raw materials, minerals and other supplies, at a reasonable cost, but the availability of these materials and supplies could be interrupted and/or their prices could change and adversely affect our sales and profitability.

We purchase energy and many raw materials, which we use to manufacture our products. Changes in their availability or price could affect our ability to manufacture enough products to meet customers' demands or to manufacture products profitably. We try to maintain multiple sources of raw materials and supplies where practical, but this may not prevent unanticipated changes in their availability or cost and, for certain raw materials, there may not be alternative sources. We may not be able to pass cost increases through to our customers. Significant disruptions in availability or cost increases could adversely affect our manufacturing volume or costs, which could negatively affect product sales or profitability of our operations.

Regulatory authorities in the U.S., European Union and elsewhere are taking a much more aggressive approach to regulating hazardous materials and other substances, and those regulations could affect sales of our products.

Legislation and regulations concerning hazardous materials and other substances can restrict the sale of products and/or increase the cost of producing them. Some of our products are subject to restrictions under laws or regulations such as California's Proposition 65 or the EU's chemical substances directive. The EU “REACH” registration system requires us to perform studies of some of our products or components of our products and to register the information in a central database, increasing the cost of these products. As a result of such regulations, customers may avoid purchasing some products in favor of less hazardous or less costly alternatives. It may be impractical for us to continue manufacturing heavily regulated products, and we may incur costs to shut down or transition such operations to alternative products. These circumstances could adversely affect our business, including our sales and operating profits.

Sales of our products to certain customers or into certain industries may expose us to different and complex regulatory regimes.

We seek to expand our customer base and the industries into which we sell. Selling products to certain customers or into certain industries, such as governments or the defense industry, requires compliance with regulatory regimes that do not apply to sales involving other customers or industries and that can be complex and difficult to navigate. Our failure to comply with these regulations could result in liabilities or damage to our reputation, which could negatively impact our business, financial condition, or results of operations.

We have limited or no redundancy for certain of our manufacturing facilities, and damage to or interference with those facilities could interrupt our operations, increase our costs of doing business and impair our ability to deliver our products on a timely basis.

If certain of our existing production facilities become incapable of manufacturing products for any reason, we may be unable to meet production requirements, we may lose revenue and we may not be able to maintain our relationships with our customers. Without operation of certain existing production facilities, we may be limited in our ability to

deliver products until we restore the manufacturing capability at the particular facility, find an alternative manufacturing facility or arrange an alternative source of supply. Although we carry business interruption insurance to cover lost revenue and profits in an amount we consider adequate, this insurance does not cover all possible situations. In addition, our business interruption insurance would not compensate us for the loss of opportunity and potential adverse impact on relations with our existing customers resulting from our inability to produce products for them.

The markets for our products are highly competitive and subject to intense price competition, which could adversely affect our sales and earnings performance.

Our customers typically have multiple suppliers from which to choose. If we are unwilling or unable to provide products at competitive prices, and if other factors, such as product performance and value-added services do not provide an offsetting competitive advantage, customers may reduce, discontinue, or decide not to purchase our products. If we could not secure alternate customers for lost business, our sales and earnings performance could be adversely affected.

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If we are unable to protect our intellectual property rights or to successfully resolve claims of infringement brought against us, our product sales and financial performance could be adversely affected.

Our performance may depend in part on our ability to establish, protect and enforce intellectual property rights with respect to our products, technologies and proprietary rights and to defend against any claims of infringement, which involves complex legal, scientific and factual questions and uncertainties. We may have to rely on litigation to enforce our intellectual property rights. The intellectual property laws of some countries may not protect our rights to the same extent as the laws of the U.S. In addition, we may face claims of infringement that could interfere with our ability to use technology or other intellectual property rights that are material to our business operations. If litigation that we initiate is unsuccessful, we may not be able to protect the value of some of our intellectual property. In the event a claim of infringement against us is successful, we may be required to pay royalties or license fees to continue to use technology or other intellectual property rights that we have been using or we may be unable to obtain necessary licenses from third parties at a reasonable cost or within a reasonable time.

Our operations are subject to operating hazards and, as a result, to stringent environmental, health and safety regulations, and compliance with those regulations could require us to make significant investments.

Our production facilities are subject to hazards associated with the manufacture, handling, storage, and transportation of chemical materials and products. These hazards can cause personal injury and loss of life, severe damage to, or destruction of, property and equipment and environmental contamination and other environmental damage and could have an adverse effect on our business, financial condition or results of operations.

We strive to maintain our production facilities and conduct our manufacturing operations in a manner that is safe and in compliance with all applicable environmental, health and safety regulations. Compliance with changing regulations, or other circumstances, may require us to make significant capital investments, incur training costs, make changes in manufacturing processes or product formulations, or incur costs that could adversely affect our profitability, and violations of these laws could lead to substantial fines and penalties. These costs may not affect competitors in the same way due to differences in product formulations, manufacturing locations or other factors, and we could be at a competitive disadvantage, which might adversely affect financial performance.

If we are unable to manage our general and administrative expenses, our business, financial condition or results of operations could be negatively impacted.

We may not be able to manage our administrative expense in all circumstances. While we attempt to effectively manage such expenses, including through projects designed to create administrative efficiencies, increases in staff-related and other administrative expenses may occur from time to time. Recently, we have made significant efforts to achieve general and administrative cost savings and improve our operational performance. As a part of these initiatives, we have and will continue to consolidate business and management operations and enter into arrangements with third parties offering additional cost savings. It cannot be assured that our strategies to reduce our general and administrative costs and improve our operating performance will be successful or achieve the anticipated savings.

Our multi-jurisdictional tax structure may not provide favorable tax efficiencies.

We conduct our business operations in a number of countries and are subject to taxation in those jurisdictions. While we seek to minimize our worldwide effective tax rate, our corporate structure may not optimize tax efficiency opportunities. We develop our tax position based upon the anticipated nature and structure of our business and the tax laws, administrative practices and judicial decisions now in effect in the countries in which we have assets or conduct

business, which are subject to change or differing interpretations. In addition, our effective tax rate could be adversely affected by several other factors, including: increases in expenses that are not deductible for tax purposes, the tax effects of restructuring charges or purchase accounting for acquisitions, changes related to our ability to ultimately realize future benefits attributed to our deferred tax assets, including those related to other-than-temporary impairment, and a change in our decision to indefinitely reinvest foreign earnings. Further, we are subject to review and audit by both domestic and foreign tax authorities, which may result in adverse decisions. Increased tax expense could have a negative effect on our operating results and financial condition.



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We have significant deferred tax assets, and if we are unable to utilize these assets, our results of operations may be adversely affected.

To fully realize the carrying value of our net deferred tax assets, we will have to generate adequate taxable profits in various tax jurisdictions. At December 31, 2015, we had \$70.9 million of net deferred tax assets, after valuation allowances. If we do not generate adequate profits within the time periods required by applicable tax statutes, the carrying value of the tax assets will not be realized. If it becomes unlikely that the carrying value of our net deferred tax assets will be realized, the valuation allowances may need to be increased in our consolidated financial statements, adversely affecting results of operations. Further information on our deferred tax assets is presented in Note 10 to the consolidated financial statements under Item 8 of this Annual Report on Form 10 K.

We may not be successful in implementing our strategies to increase our return on invested capital.

We are taking steps to generate a higher return on invested capital. There are risks associated with the implementation of these steps, which may be complicated and may involve substantial capital investment. To the extent we fail to achieve these strategies, our results of operations may be adversely affected.

We are subject to stringent labor and employment laws in certain jurisdictions in which we operate, we are party to various collective bargaining arrangements, and our relationship with our employees could deteriorate, which could adversely impact our operations.

A majority of our full-time employees are employed outside the U.S. In certain jurisdictions where we operate, labor and employment laws are relatively stringent and, in many cases, grant significant job protection to certain employees, including rights on termination of employment. In addition, in certain countries where we operate, our employees are members of unions or are represented by works councils. We are often required to consult and seek the consent or advice of these unions and/or works councils. These regulations and laws, coupled with the requirement to consult with the relevant unions or works councils, could have a significant impact on our flexibility in managing costs and responding to market changes.

Furthermore, approximately 13% of our U.S. employees as of December 31, 2015, are subject to collective bargaining arrangements or similar arrangements. None of these agreements expire during 2016, and, while we expect to be able to renew these agreements without significant disruption to our business when they are scheduled to expire, there can be no assurance that we will be able to negotiate labor agreements on satisfactory terms or that actions by our employees will not be disruptive to our business. If these workers were to engage in a strike, work stoppage or other slowdown or if other employees were to become unionized, we could experience a significant disruption of our operations and/or higher ongoing labor costs, which could adversely affect our business, financial condition and results of operations.

Employee benefit costs, especially postretirement costs, constitute a significant element of our annual expenses, and funding these costs could adversely affect our financial condition.

Employee benefit costs are a significant element of our cost structure. Certain expenses, particularly postretirement costs under defined benefit pension plans and healthcare costs for employees and retirees, may increase significantly at a rate that is difficult to forecast and may adversely affect our financial results, financial condition or cash flows. Declines in global capital markets may cause reductions in the value of our pension plan assets. Such circumstances could have an adverse effect on future pension expense and funding requirements. Further information regarding our retirement benefits is presented in Note 12 to the consolidated financial statements under Item 8 of this Annual Report

on Form 10-K.

Our implementation and operation of business information systems and processes could adversely affect our results of operations and cash flow.

We have been implementing and operating information systems and related business processes for our business operations. Implementation and operation of information systems and related processes involves risk, including risks related to programming and data transfer. Costs of implementation also could be greater than anticipated. In addition, we may be unable or decide not to implement such systems and processes in certain locations. Inherent risks, decisions and constraints related to implementation and operation of information systems could result in operating inefficiencies and could impact our ability to perform business transactions. These risks could adversely impact our results of operations, financial condition, and cash flows.

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We are subject to risks associated with outsourcing functions to third parties.

We have entered into outsourcing agreements with third parties, and rely on such parties, to provide certain services in support of our business. One such vendor provides a number of business services related to our information systems and finance and accounting activity. Arrangements with third party service providers may make our operations vulnerable if vendors fail to provide the expected service or there are changes in their own operations, financial condition, or other matters outside of our control. If these service providers are unable to perform to our requirements or to provide the level of service expected, our operating results and financial condition may suffer and we may be forced to pursue alternatives to provide these services, which could result in delays, business disruptions and additional expenses.

There are risks associated with the manufacture and sale of our materials into industries making products for sensitive applications.

We manufacture and sell materials to parties that make products for sensitive applications, such as medical devices. The supply of materials that enter the human body involves the risk of injury to consumers, as well as commercial risks. Injury to consumers could result from, among other things, tampering by unauthorized third parties or the introduction into the material of foreign objects, substances, chemicals and other agents during the manufacturing, packaging, storage, handling or transportation phases. Shipment of adulterated materials may be a violation of law and may lead to an increased risk of exposure to product liability or other claims, product recalls and increased scrutiny by federal and state regulatory agencies. Such claims or liabilities may not be covered by our insurance or by any rights of indemnity or contribution that we may have against third parties. In addition, the negative publicity surrounding any assertion that our materials caused illness or injury could have a material adverse effect on our reputation with existing and potential customers, which could negatively impact our business, operating results or financial condition.

We are exposed to lawsuits in the normal course of business, which could harm our business.

We are from time to time exposed to certain legal proceedings, which may include claims involving product liability, infringement of intellectual property rights of third parties and other claims. Due to the uncertainties of litigation, we can give no assurance that we will prevail on claims made against us in the lawsuits that we currently face or that additional claims will not be made against us in the future. We do not believe that lawsuits we currently face are likely to have a material adverse effect on our business, operating results or financial condition. Future claims or lawsuits, if they were to result in a ruling adverse to us, could give rise to substantial liability, which could have a material adverse effect on our business, operating results or financial condition.

We are exposed to intangible asset risk, and a write down of our intangible assets could have an adverse impact to our operating results and financial position.

We have recorded intangible assets, including goodwill, in connection with business acquisitions. We are required to perform goodwill impairment tests on at least an annual basis and whenever events or circumstances indicate that the carrying value may not be recoverable from estimated future cash flows. As a result of our annual and other periodic evaluations, we may determine that the intangible asset values need to be written down to their fair values, which could result in material charges that could be adverse to our operating results and financial position. See further information regarding our goodwill and other intangible assets in “Critical Accounting Policies” under Item 7 and in Note 7 to the consolidated financial statements under Item 8 of this Form 10-K.

Interest rates on some of our borrowings are variable, and our borrowing costs could be adversely affected by interest rate increases.

Portions of our debt obligations have variable interest rates. Generally, when interest rates rise, our cost of borrowings increases. We estimate, based on the debt obligations outstanding at December 31, 2015, that a one percent increase in interest rates would cause interest expense to increase by \$4.7 million annually. Although interest rates have remained relatively stable over the past few years, future increases could raise our cost of borrowings and adversely affect our financial performance. See further information regarding our interest rates on our debt obligations in “Quantitative and Qualitative Disclosures about Market Risk” under Item 7A and in Note 8 to the consolidated financial statements under Item 8 of this Form 10-K.

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Many of our assets are encumbered by liens that have been granted to lenders, and those liens affect our flexibility to dispose of property and businesses.

Certain of our debt obligations are secured by substantially all of our assets. These liens could reduce our ability and/or extend the time to dispose of property and businesses, as these liens must be cleared or waived by the lenders prior to any disposition. These security interests are described in more detail in Note 8 to the consolidated financial statements under Item 8 of this Annual Report on Form 10-K.

We may not pay dividends on our common stock at any time in the foreseeable future.

Holders of our common stock are entitled to receive such dividends as our Board of Directors from time to time may declare out of funds legally available for such purposes. Our Board of Directors has no obligation to declare dividends under Ohio law or our amended Articles of Incorporation. We may not pay dividends on our common stock at any time in the foreseeable future. Any determination by our Board of Directors to pay dividends in the future will be based on various factors, including our financial condition, results of operations and current anticipated cash needs and any limits our then-existing credit facility and other debt instruments place on our ability to pay dividends.

We are exposed to risks associated with acts of God, terrorists and others, as well as fires, explosions, wars, riots, accidents, embargoes, natural disasters, strikes and other work stoppages, quarantines and other governmental actions, and other events or circumstances that are beyond our control.

Ferro is exposed to risks from various events that are beyond our control, which may have significant effects on our results of operations. While we attempt to mitigate these risks through appropriate loss prevention measures, insurance, contingency planning and other means, we may not be able to anticipate all risks or to reasonably or cost-effectively manage those risks that we do anticipate. As a result, our operations could be adversely affected by circumstances or events in ways that are significant and/or long lasting.

The risks and uncertainties identified above are not the only risks that we face. Additional risks and uncertainties not presently known to us or that we currently believe to be immaterial also may adversely affect us. If any known or unknown risks and uncertainties develop into actual events, these developments could have material adverse effects on our financial position, results of operations, and cash flows.

### Item 1B — Unresolved Staff Comments

None.

### Item 2 — Properties

We lease our corporate headquarters offices, which are located at 6060 Parkland Blvd., Mayfield Heights, Ohio. The company owns other corporate facilities worldwide. We own principal manufacturing plants that range in size from 18,000 sq. ft. to over 700,000 sq. ft. Plants we own with more than 250,000 sq. ft. are located in Spain; Germany; Colombia; Cleveland, Ohio; Penn Yan, New York; and Mexico. The locations of these principal manufacturing plants by reportable segment are as follows:

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Pigments, Powders and Oxides-U.S.: Penn Yan, New York, Norcross, Georgia and Washington, Pennsylvania. Outside the U.S.: Colombia, China, India, Germany, Romania, Spain and Brazil.

Performance Colors and Glass-U.S.: Washington, Pennsylvania, and Orrville, Ohio. Outside the U.S.: Brazil, China, France, Germany, Mexico, Spain, and the United Kingdom.

Performance Coatings-U.S.: Cleveland, Ohio. Outside the U.S.: Argentina, Brazil, China, Egypt, France, Indonesia, Italy, Mexico, Spain, Poland, Portugal, and Thailand.

Pursuant to Ferro's revolving credit facility, the participating lenders have a security interest in the real estate of the parent company and its domestic material subsidiaries.

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In addition, we lease manufacturing facilities for the Performance Colors and Glass segment in Germany, Japan, Italy, and Vista, California; and for Performance Coatings in Italy and Poland. In some instances, the manufacturing facilities are used for two or more segments. Leased facilities range in size from 18,000 sq. ft. to over 100,000 sq. ft.

Item 3 — Legal Proceedings

There are various lawsuits and claims pending against the Company and its consolidated subsidiaries. We do not currently expect the resolution of such matters to materially affect the consolidated financial position, results of operations, or cash flows of the Company.

Item 4 — Mine Safety Disclosures

Not applicable.

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Executive Officers of the Registrant

The executive officers of the Company as of February 24, 2016, are listed below, along with their ages and business experience during the past five years. The year indicates when the individual was named to the indicated position with Ferro, unless otherwise indicated.

Peter T. Thomas — 60

Chairman of the Board of Directors, 2014

President and Chief Executive Officer, 2013

Interim President and Chief Executive Officer, 2012

Vice President, Polymer and Ceramic Engineered Materials, 2009

Mark H. Duesenberg — 54

Vice President, General Counsel and Secretary, 2008

Ann E. Killian — 61

Vice President, Human Resources, 2005

Jeffrey L. Rutherford — 55

Vice President and Chief Financial Officer, 2012

Vice President and Chief Financial Officer, Park-Ohio Holdings Corp., an industrial supply chain logistics and diversified manufacturing business, 2008



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## PART II

## Item 5 — Market for Registrant’s Common Equity, Related Stockholder Matters, and Issuer Purchases of Equity Securities

Our common stock is listed on the New York Stock Exchange under the ticker symbol FOE. On January 31, 2016, we had 1,090 shareholders of record for our common stock, and the closing price of the common stock was \$9.29 per share.

The chart below compares Ferro’s cumulative total shareholder return for the five years ended December 31, 2015, to that of the Standard & Poor’s 500 Index and the Standard & Poor’s MidCap Specialty Chemicals Index. In all cases, the information is presented on a dividend-reinvested basis and assumes investment of \$100.00 on December 31, 2010. At December 31, 2015, the closing price of our common stock was \$11.12 per share.

## COMPARISON OF FIVE-YEAR

## CUMULATIVE TOTAL RETURNS

The quarterly high and low intra-day sales prices and dividends declared per share for our common stock during 2015 and 2014 were as follows:

|                | 2015     |          |           | 2014     |          |           |
|----------------|----------|----------|-----------|----------|----------|-----------|
|                | High     | Low      | Dividends | High     | Low      | Dividends |
| First Quarter  | \$ 13.49 | \$ 11.11 | \$ —      | \$ 14.97 | \$ 11.98 | \$ —      |
| Second Quarter | 17.09    | 12.15    | —         | 14.23    | 11.86    | —         |
| Third Quarter  | 17.07    | 10.75    | —         | 15.14    | 11.95    | —         |
| Fourth Quarter | 13.30    | 10.06    | —         | 14.51    | 11.53    | —         |

The restrictive covenants contained in our Credit Facility limit the amount of dividends we can pay on our common stock. For further discussion, see Management’s Discussion and Analysis of Financial Condition and Results of Operations under Item 7 of this Annual Report on Form 10-K.

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The following table summarizes purchases of our common stock by the Company and affiliated purchasers during the three months ended December 31, 2015:

|                                       | Total Number<br>of Shares<br>Purchased(1) | Average<br>Price Paid<br>per Share | Total Number<br>of Shares<br>Purchased as<br>Part of Publicly<br>Announced<br>Plans or<br>Programs | Maximum Dollar<br>Amount that<br>May Yet Be<br>Purchased<br>Under the Plans<br>or Programs |
|---------------------------------------|---|------------------------------------|--|--|
| October 1, 2015 to October 31, 2015   | 811,275                                   | \$ 11.88                           | 811,275  | \$ 33,363,348  |
| November 1, 2015 to November 30, 2015 | 1,037,133                                 | \$ 11.72                           | 1,037,133  | \$ 21,205,376  |
| December 1, 2015 to December 31, 2015 | 854,323                                   | \$ 11.44                           | 854,323  | \$ 11,429,557  |
| Total                                 | 2,702,731                                 |                                    | 2,702,731  |  |

(1) On July 29, 2015, the Company's Board of Directors approved a stock repurchase program, authorizing the Company to repurchase up to \$25 million of the Company's outstanding shares of common stock on the open market, including through a Rule 10b5-1 plan, or in privately negotiated transactions. On October 16, 2015, the Company's Board of Directors approved a follow-on share repurchase program for the repurchase of an additional \$25 million of the Company's outstanding shares of common stock on the open market, including through a Rule 10b5-1 plan, in privately negotiated transactions, or otherwise.

## Item 6 — Selected Financial Data

The following table presents selected financial data for the last five years ended December 31st:

|  | 2015  | 2014         | 2013         | 2012         | 2011         |
|--|---|--------------|--------------|--------------|--------------|
|  | (Dollars in thousands, except for per share data) |              |              |              |              |
| Net sales  | \$ 1,075,341                                      | \$ 1,111,626 | \$ 1,188,582 | \$ 1,267,695 | \$ 1,636,639 |
| Income (loss) from continuing operations   | 99,883  | (8,609)      | 63,905       | (386,104)    | (8,504)      |
| Basic earnings (loss) per share from continuing operations attributable to Ferro Corporation common shareholders | 1.16  | (0.10)       | 0.73         | (4.49)       | (0.11)       |

|  |           |           |           |           |           |
|--|-----------|-----------|-----------|-----------|-----------|
| Diluted earnings (loss) per share from continuing operations attributable to Ferro Corporation common shareholders | 1.14      | (0.10)    | 0.72      | (4.49)    | (0.11)    |
| Cash dividends declared per common shares  | -         | -         | -         | -         | -         |
| Total assets   | 1,225,351 | 1,091,554 | 1,004,781 | 1,074,841 | 1,435,453 |
| Long-term debt, including current portion  | 470,805   | 302,383   | 265,226   | 293,915   | 295,571   |

As described in the consolidated financial statements and notes, we have adopted the provisions of ASU 2015-03 as of December 31, 2015. The ASU requires debt issuance costs for term loans to be presented in the balance sheet as a reduction of the related debt liability rather than an asset. The adoption resulted in the reclassification of \$5.3 million, \$3.4 million, \$4.3 million, and \$5.2 million of unamortized debt issuance costs related to the term loan from Total assets to a reduction in Long-term debt, including current portion within the financial data above as of December 31, 2014, 2013, 2012 and 2011, respectively.

In 2014, we commenced a process to market for sale all of the assets in our Polymer Additives reportable segment. During 2014, we sold substantially all of the assets related to our North America-based Polymer Additives business, which is presented as discontinued operations in 2011 through 2014. We have classified the Europe-based Polymer Additives operating results as discontinued operations in 2011 through 2015.

In 2014, we sold substantially all of the assets in our Specialty Plastics business, which is presented as discontinued operations in 2011 through 2014.

In 2013, we sold our Pharmaceuticals business, which is presented as discontinued operations in 2011 through 2013.

In 2012, we changed our method of recognizing defined benefit pension and other postretirement benefit expense. Under the new method, we recognize actuarial gains and losses in our operating results in the year in which the gains or losses occur. All prior periods have been previously adjusted to apply the new method retrospectively.

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Item 7 — Management’s Discussion and Analysis of Financial Condition and Results of Operations

Overview

During the year ended December 31, 2015, net sales were down \$36.3 million, or 3.3%, compared with 2014. The decrease was primarily due to unfavorable foreign currency impacts, which totaled approximately \$132.4 million, partially offset by the sales from Nubiola of \$56.9 million, which was acquired in the third quarter of 2015, and by the sales from Vettriceramici of \$56.0 million, which was acquired in the fourth quarter of 2014. Despite the decline in net sales, gross profit increased \$16.6 million compared with 2014. As a percentage of net sales excluding precious metals, gross profit rate increased approximately 230 basis points to 29.1%, from 26.8% in the prior year.

For the year ended December 31, 2015, selling, general and administrative (“SG&A”) expenses decreased \$69.9 million, or 24.4%, compared with 2014, primarily driven by the pension and other postretirement benefits mark-to-market adjustment and curtailment and settlement effects. In 2015, the adjustment resulted in a loss of \$8.2 million in SG&A, while in 2014, the adjustment resulted in a loss of \$88.5 million.

For the year ended December 31, 2015, net income was \$63.1 million, compared with net income of \$86.2 million in 2014, and net income attributable to common shareholders was \$64.1 million, compared with net income attributable to common shareholders of \$86.1 million in 2014. Income from continuing operations was \$99.9 million for the year ended December 31, 2015, compared with loss from continuing operations of \$8.6 million in 2014. Gross profit in 2015 was \$301.7 million, compared with \$285.1 million in 2014.

Outlook

During 2015, despite challenging currency and global economic conditions, the Company delivered strong performance and continued to advance on our value creation strategy. During the past 18 months, we have invested in acquisitions that complement our existing businesses, provide attractive margins, and improve our capabilities in important growth markets. We are well positioned strategically to leverage our infrastructure and market leading positions to achieve or exceed our performance targets and generate stronger returns for our shareholders.

We expect foreign currency to continue to have a negative impact on our results. The earnings improvement will be driven by contributions from acquisitions, organic sales growth and continued focus on reducing our direct and indirect purchasing costs. In addition, we intend to continue making acquisitions. We have a robust pipeline of acquisition targets and the financial flexibility to pursue them. Our acquisition growth objective is to invest \$100 million annually to add assets that strengthen our product and technology portfolios, improve our market position, expand our global reach, and drive shareholder value.

For 2016, we expect sales growth of 10 – 11%, including the addition of our acquisitions and excluding the adverse impact of the changes in foreign currency. We expect gross profit margins will improve by 50 – 100 basis points, based primarily on higher volumes, and improved business mix. In addition, we will continue to focus on reducing costs in SG&A and manufacturing related operations. We expect the result of our efforts in all of these areas will allow the Company to generate \$80 - \$90 million of free cash flow in 2016.

We continue to be focused on integration of our recent acquisitions, including Al Salomi and Nubiola, which were acquired in 2015. Further, we are continuing efforts to divest our Europe-based Polymer Additives assets. These assets to be divested are classified as held-for-sale on our consolidated balance sheets.

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## Results of Operations - Consolidated

## Comparison of the years ended December 31, 2015 and 2014

For the year ended December 31, 2015, income from continuing operations was \$99.9 million, compared with loss from continuing operations of \$8.6 million in 2014. For the year ended December 31, 2015, net income was \$63.1 million, compared with net income of \$86.2 million in 2014. For the year ended December 31, 2015, net income attributable to common shareholders was \$64.1 million, or \$0.74 per share, compared with net income attributable to common shareholders of \$86.1 million, or \$0.99 per share in 2014.

## Net Sales

|  | 2015                   | 2014         | \$ Change   | %<br>Change |
|--|------------------------|--------------|-------------|-------------|
|  | (Dollars in thousands) |              |             |             |
| Net sales excluding precious metals                        | \$ 1,037,969           | \$ 1,065,652 | \$ (27,683) | (2.6) %     |
| Sales of precious metals                                   | 37,372                 | 45,974       | (8,602)     | (18.7) %    |
| Net sales  | 1,075,341              | 1,111,626    | (36,285)    | (3.3) %     |
| Cost of sales  | 773,661                | 826,541      | (52,880)    | (6.4) %     |
| Gross profit   | \$ 301,680             | \$ 285,085   | \$ 16,595   | 5.8 %       |
| Gross profit as a % of net sales excluding precious metals | 29.1 %                 | 26.8 %       |             |             |

Net sales decreased by \$36.3 million, or 3.3%, in the year ended December 31, 2015, compared with the prior year. Net sales excluding precious metals decreased \$27.7 million, primarily driven by decreased sales in Performance Coatings and Performance Colors and Glass of \$55.2 million and \$28.0 million, respectively, partially mitigated by increased net sales in Pigments, Powders and Oxides of \$55.5 million. The main driver of the decrease in net sales excluding precious metals was unfavorable foreign currency impacts, which totaled approximately \$132.4 million, and unfavorable pricing impacts of \$16.6 million, partially mitigated by \$56.9 million of sales from Nubiola, which was acquired in the third quarter of 2015, and \$56.0 million of sales from Vetriceramici, which was acquired in the fourth quarter of 2014. The decline in precious metal sales in 2015 was attributable to the expiration of tolling arrangements resulting from the sale of our North American and Asian metal powders business and exit of our solar pastes business in 2014, which contributed \$5.7 million of the decrease and was driven by lower sales in Performance Colors and Glass of \$2.9 million, compared with 2014.

## Gross Profit

Gross profit increased \$16.6 million, or 5.8%, in 2015 to \$301.7 million, compared with \$285.1 million in 2014 and as a percentage of net sales excluding precious metals, it increased 230 basis points to 29.1%. The significant driver of the increased gross profit was strong performance in our Pigments, Powders and Oxides segment which exceeded prior-year gross profit by \$17.2 million, primarily driven by Nubiola, which was acquired in the third quarter of

2015. Gross profit was negatively impacted by a charge of \$5.8 million related to a purchase price adjustment from the acquisition of Nubiola, which was acquired in the third quarter of 2015, for step up of inventory acquired and subsequently sold in the third quarter that will not recur.

#### Geographic Revenues

The following table presents our sales on the basis of where sales originated.

|   | 2015                   | 2014         | \$ Change   | %<br>Change |
|---|------------------------|--------------|-------------|-------------|
| Geographic Revenues                       | (Dollars in thousands) |              |             |             |
| Europe                                    | \$ 457,723             | \$ 479,771   | \$ (22,048) | (4.6) %     |
| United States                             | 261,815                | 242,512      | 19,303      | 8.0 %       |
| Asia Pacific                              | 160,493                | 182,339      | (21,846)    | (12.0)%     |
| Latin America                             | 157,938                | 161,030      | (3,092)     | (1.9) %     |
| Total net sales excluding precious metals | \$ 1,037,969           | \$ 1,065,652 | \$ (27,683) | (2.6) %     |
| Sale of precious metals                   | 37,372                 | 45,974       | (8,602)     | (18.7)%     |
| Net sales                                 | \$ 1,075,341           | \$ 1,111,626 | \$ (36,285) | (3.3) %     |

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The decline in net sales excluding precious metals of \$27.7 million, compared with 2014, was driven by decreased sales in Europe, Asia Pacific and Latin America, partially mitigated by an increase in sales in the United States. The decline in sales in Europe was due to lower sales in Performance Colors and Glass and Performance Coatings of \$20.4 million and \$18.7 million, respectively, and was largely due to unfavorable foreign currency impacts. The decrease in Europe was partially mitigated by increased sales in Pigments, Powders and Oxides of \$17.1 million, driven by sales from Nubiola, which was acquired in the third quarter of 2015. The decline in Asia Pacific was driven by lower sales of \$22.6 million in Performance Coatings and the result of the sale of our North American and Asian metal powders business, which comprised \$2.3 million of the decrease. The decrease was partially mitigated by an increase in sales in Pigments, Powders and Oxides primarily driven by sales from Nubiola of \$6.9 million. The lower sales in Latin America was due to lower sales in Performance Coatings and Performance Colors and Glass of \$8.9 million and \$7.4 million, respectively, partially mitigated by higher sales in Pigments, Powders and Oxides of \$13.2 million. The decline in sales in Latin America in Performance Coatings was primarily due to the unfavorable foreign currency impacts related to the change in currency exchange mechanisms in Venezuela during the first quarter of 2015 and the sale of our operating affiliate in Venezuela in the fourth quarter of 2015. The higher sales in the United States in 2015 compared to 2014, was driven by higher sales volumes within Pigments, Powders and Oxides and Performance Colors and Glass, partially offset by lower sales in Performance Coatings.

The following table presents our sales on the basis of where sold products were shipped.

|   | 2015                   | 2014         | \$ Change   | %<br>Change |
|---|------------------------|--------------|-------------|-------------|
| Geographic Revenues on a ship to basis    | (Dollars in thousands) |              |             |             |
| Europe                                    | \$ 453,580             | \$ 474,102   | \$ (20,522) | (4.3) %     |
| Asia Pacific                              | 206,924                | 215,756      | (8,832)     | (4.1) %     |
| United States                             | 199,762                | 189,991      | 9,771       | 5.1 %       |
| Latin America                             | 177,703                | 185,803      | (8,100)     | (4.4) %     |
| Total net sales excluding precious metals | \$ 1,037,969           | \$ 1,065,652 | \$ (27,683) | (2.6) %     |
| Sale of precious metals                   | 37,372                 | 45,974       | (8,602)     | (18.7)%     |
| Net sales                                 | \$ 1,075,341           | \$ 1,111,626 | \$ (36,285) | (3.3) %     |

## Selling, General and Administrative Expense

The following table presents selling, general and administrative expenses attributable to operating sites and regional costs outside the United States together as Performance Materials, and regional costs attributable to the United States and other Corporate costs together as Corporate. Performance Materials and Corporate SG&A expenses exclude the impact of the annual mark-to-market adjustment and curtailment and settlement effects on our pension and other postretirement benefit plans, as the volatility in this adjustment does not allow for a meaningful comparison of underlying SG&A costs between periods.



|   | 2015                   | 2014       | \$ Change   | %<br>Change |
|---|------------------------|------------|-------------|-------------|
|   | (Dollars in thousands) |            |             |             |
| Performance Materials   | \$ 142,456             | \$ 130,824 | \$ 11,632   | 8.9 %       |
| Corporate   | 66,207                 | 67,415     | (1,208)     | (1.8) %     |
| Pension and other postretirement benefits mark-to-market adjustment<br>and curtailment and settlement effects | 8,236                  | 88,523     | (80,287)    | (90.7)%     |
| Selling, general and administrative expenses  | \$ 216,899             | \$ 286,762 | \$ (69,863) | (24.4)%     |

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The following table includes SG&A components with significant changes between 2015 and 2014:

|  | 2015                   | 2014       | \$ Change   | % Change |
|--|------------------------|------------|-------------|----------|
|  | (Dollars in thousands) |            |             |          |
| Personnel expenses                           | \$ 114,386             | \$ 107,159 | \$ 7,227    | 6.7 %    |
| Business development                         | 13,527                 | 3,468      | 10,059      | 290.1 %  |
| Stock-based compensation                     | 8,868                  | 9,679      | (811)       | (8.4) %  |
| Incentive compensation                       | 4,982                  | 11,598     | (6,616)     | (57.0) % |
| Pension and other postretirement benefits    | 1,494                  | 85,081     | (83,587)    | (98.2) % |
| Bad debt                                     | 667                    | 2,657      | (1,990)     | (74.9) % |
| All other expenses                           | 72,975                 | 67,120     | 5,855       | 8.7 %    |
| Selling, general and administrative expenses | \$ 216,899             | \$ 286,762 | \$ (69,863) | (24.4) % |

SG&A expenses were \$69.9 million lower in 2015 compared with the prior year. As a percentage of net sales excluding precious metals, SG&A expenses decreased 600 basis points from 26.9% in 2014 to 20.9% in 2015. The most significant driver of the decrease in SG&A expenses in 2015 was the change in the mark-to-market loss and curtailment and settlement effects on our defined benefit pension plans and postretirement health care and life insurance benefit plans of \$80.3 million, and is included within the pension and other postretirement benefits line above. The expense in 2014 was primarily related to changes in actuarial assumptions used in calculating the value of the U.S. pension liability. In addition, during 2014, the Company adopted the use of new mortality tables within its calculation assumptions, which had a one-time impact of increasing the liability. The new mortality tables reflect underlying increases in life expectancy of participants, thus driving longer benefit payment periods. The impact of the change in mortality assumption on the U.S. pension liability was an increase of the liability of approximately \$18 million. Excluding the impacts of the mark-to-market adjustments and curtailment and settlement effects, SG&A expenses increased 150 basis points from 18.6% in 2014 to 20.1% in 2015. Included in SG&A expenses were \$8.1 million and \$12.5 million of expenses attributable to Nubiola and Vettriceramici, which were acquired in the third quarter of 2015 and the fourth quarter of 2014, respectively. The increase in business development costs of \$10.1 million was a result of higher costs associated with professional fees that were related to business development activities. These increases were offset by lower incentive compensation expense of \$6.6 million, which is based on certain performance metrics, and lower bad debt expenses of \$2.0 million. The decrease in SG&A is also a result of foreign currency impacts.

## Restructuring and Impairment Charges

|                    | 2015                   | 2014  | \$ Change | % Change |
|--------------------|------------------------|-------|-----------|----------|
|                    | (Dollars in thousands) |       |           |          |
| Employee severance | 4,015                  | 2,744 | 1,271     | 46.3 %   |

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|                                      |          |          |         |          |
|--------------------------------------|----------|----------|---------|----------|
| Lease termination costs              | —        | 2,468    | (2,468) | (100.0)% |
| Other restructuring costs            | 5,640    | 3,637    | 2,003   | 55.1 %   |
| Restructuring and impairment charges | \$ 9,655 | \$ 8,849 | \$ 806  | 9.1 %    |

Restructuring and impairment charges increased in 2015 compared with 2014. The primary drivers were the increase in employee severance cost of \$1.3 million in 2015 compared with 2014 and the early termination cost of a contract associated with restructuring a corporate function of \$2.8 million during in 2015. The increase in restructuring and impairment charges was partially mitigated by a decrease of \$2.5 million due to a lease termination charge that occurred in 2014.

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## Interest Expense

|                           | 2015                   | 2014      | \$ Change  | %<br>Change |
|---------------------------|------------------------|-----------|------------|-------------|
|                           | (Dollars in thousands) |           |            |             |
| Interest expense          | \$ 15,464              | \$ 16,895 | \$ (1,431) | (8.5) %     |
| Amortization of bank fees | 1,125                  | 1,337     | (212)      | (15.9)%     |
| Interest capitalization   | (1,426)                | (1,969)   | 543        | (27.6)%     |
| Interest expense          | \$ 15,163              | \$ 16,263 | \$ (1,100) | (6.8) %     |

Interest expense in 2015 decreased \$1.1 million compared with 2014, primarily due to the redemption of the 7.875% Senior Notes and refinancing of the 2013 Revolving Credit Facility during the third quarter of 2014. The decrease was partially offset by reduced interest capitalization related to the construction project at our Antwerp, Belgium facility in 2015 compared with 2014.

## Income Tax Expense

In 2015, we recorded an income tax benefit of \$45.1 million, or (82.3%) of income before income taxes, compared to an income tax benefit of \$34.2 million, or 79.9% of loss before taxes in 2014. The 2015 effective tax rate was less than the statutory income tax rate of 35% primarily as a result of a \$3.1 million benefit for the release of the valuation allowances related to deferred tax assets that were utilized in the current year, \$7.3 million benefit related to the expiration of fully valued tax credits and \$63.3 million benefit for the release of valuation allowances deemed no longer necessary. The 2014 effective tax rate was greater than the statutory income tax rate of 35% primarily as a result of a \$17.4 million benefit related to the release of valuation allowances for deferred tax assets that were utilized in the 2014, the release of valuation allowances deemed no longer necessary and the expiration of fully valued tax attributes, \$15.2 million of benefit related to 2014 domestic foreign tax credit generated and utilized, and foreign tax rate differences from the statutory income tax rate of 35%.

## Comparison of the years ended December 31, 2014 and 2013

For the year ended December 31, 2014, loss from continuing operations was \$8.6 million, compared with income from continuing operations of \$63.9 million in 2013. For the year ended December 31, 2014, net income was \$86.2 million, compared with net income of \$72.4 million in 2013. For the year ended December 31, 2014, net income attributable to common shareholders was \$86.1 million, or \$0.99 earnings per share, compared with net income attributable to common shareholders of \$71.9 million, or \$0.83 earnings per share in 2013.

## Net Sales

|  | 2014 | 2013 | \$ Change | %<br>Change |
|--|------|------|-----------|-------------|
|--|------|------|-----------|-------------|

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(Dollars in thousands)

|  |              |              |             |        |   |
|--|--------------|--------------|-------------|--------|---|
| Net sales excluding precious metals                        | \$ 1,065,652 | \$ 1,091,860 | \$ (26,208) | (2.4)  | % |
| Sales of precious metals                                   | 45,974       | 96,722       | (50,748)    | (52.5) | % |
| Net sales  | 1,111,626    | 1,188,582    | (76,956)    | (6.5)  | % |
| Cost of sales  | 826,541      | 910,910      | (84,369)    | (9.3)  | % |
| Gross profit   | \$ 285,085   | \$ 277,672   | \$ 7,413    | 2.7    | % |
| Gross profit as a % of net sales excluding precious metals | 26.8         | %            | 25.4        | %      |   |

Net sales decreased by \$77.0 million, or 6.5% in the year ended December 31, 2014, compared with the prior year.

Net sales excluding precious metals decreased \$26.2 million, driven by decreased sales in our Pigments, Powders and Oxides segment of \$35.6 million, primarily due to the sale of our North American and Asian metal powders business and exit of solar pastes during 2013, and decreased sales in our Performance Coatings segment of \$11.8 million. Partially mitigating these declines were increased sales in our Performance Colors and Glass segment of \$21.2 million. Sales of precious metals were down compared with the prior year primarily due to the sale of our North American and Asian metal powders business and the exit of solar pastes which contributed \$47.2 million of the decline.

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## Gross Profit

Gross profit increased \$7.4 million, or 2.7% in 2014 to \$285.1 million, compared with \$277.7 million in 2013. The significant driver of the increased gross profit was strong performance in our Performance Colors and Glass segment which exceeded prior year gross profit by \$22.1 million, primarily driven by higher sales volumes and favorable mix, favorable product pricing, and favorable manufacturing costs. This increase was partially offset by lower gross profit in our Pigments, Powders and Oxides and Performance Coatings segments.

## Geographic Revenues

The following table presents our sales on the basis of where sales originated.

|   | 2014                   | 2013         | \$ Change   | %<br>Change |
|---|------------------------|--------------|-------------|-------------|
| Geographic Revenues                       | (Dollars in thousands) |              |             |             |
| Europe                                    | \$ 479,771             | \$ 480,897   | \$ (1,126)  | (0.2) %     |
| United States                             | 242,512                | 264,944      | (22,432)    | (8.5) %     |
| Asia Pacific                              | 182,339                | 183,797      | (1,458)     | (0.8) %     |
| Latin America                             | 161,030                | 162,222      | (1,192)     | (0.7) %     |
| Total net sales excluding precious metals | \$ 1,065,652           | \$ 1,091,860 | \$ (26,208) | (2.4) %     |
| Sale of precious metals                   | 45,974                 | 96,722       | (50,748)    | (52.5)%     |
| Net sales                                 | \$ 1,111,626           | \$ 1,188,582 | \$ (76,956) | (6.5) %     |

The decline in net sales excluding precious metals of \$26.2 million, compared with 2013, was driven by declines in all regions. The decline in sales was largely driven by the sale of our North American and Asian metal powders business and exit of solar pastes, which resulted in a decrease of \$27.5 million, partially mitigated by higher sales in the United States for Performance Colors and Glass products of \$11.2 million. In addition, lower sales in Latin America were due to decreased sales in our Performance Coatings and Pigments, Powders and Oxides segments of \$5.5 million and \$3.0 million, respectively, partially offset by higher sales in Performance Colors and Glass. The decline in sales in Europe in 2014 compared with 2013 was attributable to lower sales of Performance Coatings products of \$1.9 million, partially mitigated by slightly higher sales of Pigments, Powders and Oxides products compared to the prior year.

The following table presents our sales on the basis of where sold products were shipped.

|  | 2014                   | 2013       | \$ Change   | %<br>Change |
|--|------------------------|------------|-------------|-------------|
| Geographic Revenues on a ship to basis | (Dollars in thousands) |            |             |             |
| Europe                                 | \$ 474,102             | \$ 488,581 | \$ (14,479) | (3.0) %     |

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|   |              |              |             |          |
|---|--------------|--------------|-------------|----------|
| Asia Pacific                                | 215,756      | 220,032      | (4,276)     | (1.9) %  |
| United States                               | 189,991      | 197,390      | (7,399)     | (3.7) %  |
| Latin America                               | 185,803      | 185,857      | (54)        | (0.0) %  |
| Total net sales excluding precious metals   | \$ 1,065,652 | \$ 1,091,860 | \$ (26,208) | (2.4) %  |
| Sale of precious metals                     | 45,974       | 96,722       | (50,748)    | (52.5) % |
| Net sales                                   | \$ 1,111,626 | \$ 1,188,582 | \$ (76,956) | (6.5) %  |
| Selling, General and Administrative Expense |              |              |             |          |

The following table presents selling, general and administrative expenses attributable to operating sites and regional costs outside the United States together as Performance Materials, and regional costs attributable to the United States and other Corporate costs together as Corporate. Performance Materials and Corporate SG&A expenses exclude the impact of the annual mark-to-market

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adjustment and curtailment and settlement effects on our pension and other postretirement benefit plans, as the volatility in this adjustment does not allow for a meaningful comparison of underlying SG&A costs between periods.

|  | 2014                   | 2013       | \$ Change   | % Change |
|--|------------------------|------------|-------------|----------|
|  | (Dollars in thousands) |            |             |          |
| Performance Materials  | \$ 130,824             | \$ 153,750 | \$ (22,926) | (14.9) % |
| Corporate  | 67,415                 | 67,450     | (35)        | (0.1) %  |
| Pension and other postretirement benefits mark-to-market adjustment and curtailment and settlement effects | 88,523                 | (70,447)   | 158,970     | (225.7)% |
| Selling, general and administrative expenses   | \$ 286,762             | \$ 150,753 | \$ 136,009  | 90.2 %   |

The following table includes SG&A components with significant changes between 2014 and 2013:

|  | 2014                   | 2013       | \$ Change   | % Change |
|--|------------------------|------------|-------------|----------|
|  | (Dollars in thousands) |            |             |          |
| Personnel expenses                           | \$ 107,159             | \$ 120,717 | \$ (13,558) | (11.2) % |
| Incentive compensation                       | 11,598                 | 18,459     | (6,861)     | (37.2) % |
| Stock-based compensation                     | 9,679                  | 6,890      | 2,789       | 40.5 %   |
| Pension and other postretirement benefits    | 85,081                 | (71,845)   | 156,926     | (218.4)% |
| Bad debt                                     | 2,657                  | 3,961      | (1,304)     | (32.9) % |
| Business development                         | 3,468                  | 1,415      | 2,053       | 145.1 %  |
| All other expenses                           | 67,120                 | 71,156     | (4,036)     | (5.7) %  |
| Selling, general and administrative expenses | \$ 286,762             | \$ 150,753 | \$ 136,009  | 90.2 %   |

SG&A expenses were \$136.0 million higher in 2014 compared with the prior year. As a percentage of net sales excluding precious metals, SG&A expenses increased from 13.8% in the prior year to 26.9% in 2014. The most significant driver of the increase in SG&A expenses in 2014 was the mark-to-market loss and curtailment and settlement effects on our defined benefit pension plans and postretirement health care and life insurance benefit plans of \$88.5 million, and is included within the pension and other postretirement benefits line above. The adjustment was primarily related to changes in actuarial assumptions used in calculating the value of the U.S. pension liability. In 2014, the discount rate used to value the liability declined by 100 basis points, compared with the prior year, thereby increasing the value of the liability by approximately \$50 million. In addition, during the fourth quarter of 2014, the Company adopted the use of new mortality tables within its calculation assumptions, which had a one-time impact of



increasing the liability. The new mortality tables reflect underlying increases in life expectancy of participants, thus driving longer benefit payment periods. The impact of the change in mortality assumption on the U.S. pension liability was an increase of the liability of approximately \$18 million. In 2013, the mark-to-market adjustments and curtailment and settlement effects resulted in an actuarial gain of \$70.4 million. The 2013 gain was primarily driven by the change in discount rate used to value the liability, which increased by 95 basis points, compared with 2012, resulting in a reduction in the value of the liability. Excluding the impacts of the mark-to-market adjustments and curtailment and settlement effects, SG&A expenses decreased 170 basis points from 20.3% in the prior year to 18.6% in 2014. Various restructuring activities executed in 2013 that had a full year impact in 2014 drove the decrease in personnel expenses. The decreases were partially offset by higher stock-based compensation expense due to higher grants to retirement-eligible employees that require accelerated expense recognition, and the impact of improved stock price on our liability based awards.

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## Restructuring and Impairment Charges

|                                      | 2014                   | 2013      | \$ Change   | % Change |
|--------------------------------------|------------------------|-----------|-------------|----------|
|                                      | (Dollars in thousands) |           |             |          |
| Amortizable intangible assets        | \$ —                   | \$ 2,102  | \$ (2,102)  | (100.0)% |
| Property, plant and equipment        | —                      | 7,484     | (7,484)     | (100.0)% |
| Corporate plane                      | —                      | 1,242     | (1,242)     | (100.0)% |
| Employee severance                   | 2,744                  | 20,922    | (18,178)    | (86.9) % |
| Lease termination costs              | 2,468                  | —         | 2,468       | 100.0 %  |
| Other restructuring costs            | 3,637                  | 9,179     | (5,542)     | (60.4) % |
| Restructuring and impairment charges | \$ 8,849               | \$ 40,929 | \$ (32,080) | (78.4) % |

Restructuring and impairment charges decreased significantly in 2014 compared with 2013. The primary drivers of the decline were the decrease in employee severance cost of \$18.2 million in 2014 compared with 2013 and the various 2013 impairment charges of \$10.8 million that did not recur in 2014. Many of our restructuring activities commenced during the first half of 2013, thereby driving the higher prior year expenses. We had fewer restructuring activities during 2014.

## Interest Expense

|                           | 2014                   | 2013      | \$ Change  | % Change |
|---------------------------|------------------------|-----------|------------|----------|
|                           | (Dollars in thousands) |           |            |          |
| Interest expense          | \$ 16,895              | \$ 18,164 | \$ (1,269) | (7.0) %  |
| Amortization of bank fees | 1,337                  | 2,905     | (1,568)    | (54.0) % |
| Interest capitalization   | (1,969)                | (917)     | (1,052)    | 114.7 %  |
| Interest expense          | \$ 16,263              | \$ 20,152 | \$ (3,889) | (19.3) % |

Interest expense in 2014 decreased \$3.9 million compared with 2013, primarily due to the amendment of our revolving credit facility and retirement of the 7.875% Senior Notes. Additionally, interest expense decreased due to additional interest capitalization related to the construction project at our Antwerp, Belgium facility.

## Income Tax Expense

In 2014, we recorded an income tax benefit of \$34.2 million, or 79.9% of loss before income taxes, compared with an income tax expense of \$14.3 million, or 18.3% of income before taxes in 2013. The 2014 effective tax rate was greater than the statutory income tax rate of 35% primarily as a result of a \$17.4 million benefit for the release of the valuation allowances related to deferred tax assets that were utilized in 2014, the release of valuation allowances concluded to no longer be necessary and the expiration of fully valued tax attributes, \$15.2 million of benefit related to 2014 domestic foreign tax credit generated and utilized, and foreign tax rate differences from the statutory income tax rate of 35%. The 2013 effective tax rate was less than the statutory income tax rate of 35% primarily as a result of a \$21.1 million benefit for the release of the valuation allowances related to deferred tax assets that were utilized and the expiration of fully valued tax credits, offset by a \$6.8 million charge related to the expiration of the fully valued tax credits.

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## Results of Operations - Segment Information

Comparison of the years ended December 31, 2015 and 2014

## Performance Coatings

|  | 2015                   | 2014       | \$ Change   | %<br>Change | Change due to<br>Price | Change due to<br>Volume<br>/ | Currency | Other  |
|--|------------------------|------------|-------------|-------------|------------------------|------------------------------|----------|--------|
|  | (Dollars in thousands) |            |             |             |                        |                              |          |        |
| Segment net sales                        | \$ 533,370             | \$ 588,538 | \$ (55,168) | (9.4)%      | \$ (19,411)            | 55,049                       | (90,806) | \$ —   |
| Segment gross profit                     | 126,945                | 131,043    | (4,098)     | (3.1)%      | (19,411)               | 15,053                       | (18,667) | 18,927 |
| Gross profit as a % of segment net sales | 23.8 %                 | 22.3 %     |             |             |                        |                              |          |        |

Net sales decreased in Performance Coatings compared with 2014 due to lower sales of frits and glazes, colors, porcelain enamels, digital inks and other tile product lines of \$54.3 million, \$17.9 million, \$17.8 million, \$12.8 million and \$6.9 million, respectively. The sales decline was partially mitigated by an increase of \$54.5 million in sales from Vettriceramici, which was acquired in the fourth quarter of 2014. A substantial portion of the decline in sales was attributed to unfavorable foreign currency impacts of \$90.8 million and lower product pricing of \$19.4 million, partially mitigated by favorable mix and higher sales volumes of \$22.7 million and \$32.3 million, respectively. Gross profit decreased from 2014, and was driven by lower product pricing impacts of \$19.4 million and unfavorable foreign currency impacts of \$18.7 million, partially mitigated by favorable volume and mix of 15.1 million, lower manufacturing costs of \$11.1 million and favorable raw material impacts of \$7.8 million.

|  | 2015 | 2014 | \$ Change | %<br>Change |
|--|------|------|-----------|-------------|
|--|------|------|-----------|-------------|

(Dollars in thousands)

| Segment net sales by Region |            |            |             |        |   |
|-----------------------------|------------|------------|-------------|--------|---|
| Europe                      | \$ 278,581 | \$ 297,324 | \$ (18,743) | (6.3)  | % |
| Latin America               | 123,152    | 132,015    | (8,863)     | (6.7)  | % |
| Asia Pacific                | 85,850     | 108,419    | (22,569)    | (20.8) | % |
| United States               | 45,787     | 50,780     | (4,993)     | (9.8)  | % |
| Total                       | \$ 533,370 | \$ 588,538 | \$ (55,168) | (9.4)  | % |

The net sales decrease of \$55.2 million compared with 2014 reflected lower sales in all regions. The decline in Asia Pacific was driven by lower sales of frits and glaze products, digital inks, porcelain enamels, and colors of \$12.4 million, \$4.0 million, \$3.3 million, and \$2.9 million respectively. The decline in sales in Europe was attributable to lower sales of our porcelain enamel products, partially mitigated by higher sales of tile products, including Vettriceramici sales. The decline in sales in Latin America, compared to 2014 was due to lower sales in colors and porcelain enamel products, partially mitigated by higher sales of digital inks products. The decline in the United States was attributable to porcelain enamel products.

## Performance Colors and Glass

|   | 2015       | 2014       | \$ Change   | % Change | Change due to |          |             |       |
|---|------------|------------|-------------|----------|---------------|----------|-------------|-------|
|   |            |            |             |          | Price         | Mix      | Currency    | Other |
| Segment net sales excluding precious metals | \$ 339,610 | \$ 367,637 | \$ (28,027) | (7.6)%   | \$ 2,451      | \$ 5,585 | \$ (36,063) | \$ —  |
| Segment precious metal sales                | 37,159     | 40,037     | (2,878)     | (7.2)%   |               |          |             |       |
| Segment net sales                           | 376,769    | 407,674    | (30,905)    | (7.6)%   |               |          |             |       |
| Segment gross profit                        | 128,209    | 134,964    | (6,755)     | (5.0)%   | 2,451         | (6,798)  | (12,278)    | 9,870 |
| Gross profit as a % of segment net sales    | 37.8       | %          | 36.7        | %        |               |          |             |       |

Net sales excluding precious metals decreased \$28.0 million in 2015 compared with 2014, with decreases of \$18.0 million in decoration, \$6.4 million in industrial products, \$4.4 million in automotive, and \$0.7 million in electronics, partially mitigated by an

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increase in sales of \$1.5 million from Vetriceramici, which was acquired in the fourth quarter of 2014. Net sales excluding precious metals were impacted by unfavorable foreign currency impacts of \$36.1 million and lower sales volume of \$2.4 million, partially mitigated by favorable mix of \$8.0 million and higher product pricing of \$2.5 million. Gross profit decreased from 2014, due to unfavorable foreign currency impacts of \$12.3 million, unfavorable sales volumes and mix of \$6.8 million, and higher manufacturing costs of \$1.0 million, partially mitigated by favorable raw material impacts of \$10.9 million and higher product pricing impacts of \$2.5 million.

|   | 2015                   | 2014       | \$ Change   | %<br>Change |
|---|------------------------|------------|-------------|-------------|
|   | (Dollars in thousands) |            |             |             |
| Segment net sales excluding precious metals by Region |                        |            |             |             |
| Europe  | \$ 140,497             | \$ 160,901 | \$ (20,404) | (12.7)%     |
| United States   | 123,856                | 119,707    | 4,149       | 3.5 %       |
| Asia Pacific  | 55,663                 | 60,004     | (4,341)     | (7.2) %     |
| Latin America   | 19,594                 | 27,025     | (7,431)     | (27.5)%     |
| Total   | \$ 339,610             | \$ 367,637 | \$ (28,027) | (7.6) %     |

The decrease in net sales excluding precious metals of \$28.0 million compared with 2014, was primarily driven by lower sales in decoration products and industrial products in Europe of \$8.0 million and \$7.5 million, respectively, and lower sales of decoration products in Latin America and Asia Pacific of \$8.3 million and \$3.0 million. The decrease was partially mitigated by higher sales in industrial products, electronics and decoration in the United States of \$1.7 million, \$1.5 million and \$1.3 million, respectively.

## Pigments, Powders and Oxides

|   | 2015                   | 2014       | \$ Change | %<br>Change | Change due to |        |          |       |
|---|------------------------|------------|-----------|-------------|---------------|--------|----------|-------|
|   | (Dollars in thousands) |            |           |             | Price         | Mix    | Currency | Other |
| Segment net sales excluding precious metals | \$ 164,989             | \$ 109,477 | \$ 55,512 | 50.7 %      | \$ 400        | 60,634 | (5,522)  | \$ —  |

|  |         |         |         |         |     |        |         |       |
|--|---------|---------|---------|---------|-----|--------|---------|-------|
| Segment precious metal sales             | 213     | 5,937   | (5,724) | (96.4)% |     |        |         |       |
| Segment net sales                        | 165,202 | 115,414 | 49,788  | 43.1%   |     |        |         |       |
| Segment gross profit                     | 45,678  | 28,480  | 17,198  | 60.4%   | 400 | 13,099 | (1,250) | 4,949 |
| Gross profit as a % of segment net sales | 27.69%  | 26.01%  |         |         |     |        |         |       |

Net sales excluding precious metals increased compared with 2014, primarily due to higher volume and mix of \$60.6 million, of which \$56.9 million is related to sales from the Nubiola acquisition in the third quarter of 2015. The increase in sales is also due to favorable product pricing impacts of \$0.4 million, partially mitigated by unfavorable foreign currency impacts of \$5.5 million. Gross profit increased from 2014 and was a result of favorable volume and mix of \$13.1 million, lower manufacturing costs of \$3.6 million, favorable raw material impacts of \$1.3 million, and higher product pricing of \$0.4 million, partially offset by unfavorable foreign currency impacts of \$1.2 million. Gross profit was negatively impacted by a charge of \$5.8 million related to a purchase price adjustment from the acquisition of Nubiola, which was acquired in the third quarter of 2015, for step up of inventory acquired and subsequently sold in the third quarter that will not recur.

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|   | 2015                   | 2014       | \$ Change | %<br>Change |
|---|------------------------|------------|-----------|-------------|
|   | (Dollars in thousands) |            |           |             |
| Segment net sales excluding precious metals by Region |                        |            |           |             |
| United States   | \$ 92,172              | \$ 72,025  | \$ 20,147 | 28.0 %      |
| Europe  | 38,645                 | 21,546     | 17,099    | 79.4 %      |
| Asia Pacific  | 18,980                 | 13,916     | 5,064     | 36.4 %      |
| Latin America   | 15,192                 | 1,990      | 13,202    | 663.4 %     |
| Total   | \$ 164,989             | \$ 109,477 | \$ 55,512 | 50.7 %      |

The increase in net sales excluding precious metals of \$55.5 million compared with 2014 was due to higher sales across all regions. The increase in sales in the United States was driven by increases of \$4.8 million in surface finishing products, \$0.6 million in pigments, and \$15.2 million by sales from Nubiola, which was acquired in the third quarter of 2015, partially mitigated by a decrease in sales of \$0.5 million in liquid coatings. The increase in sales in Europe and Latin America was driven by sales from Nubiola of \$21.2 million and \$13.7 million, respectively, partially mitigated by a decrease in sales of \$4.1 million and \$0.5 million in pigments, respectively. The increase in sales in Asia Pacific was primarily driven by sales from Nubiola of \$6.9 million, which were partially offset by the sale of our North American and Asian metal powders business, which contributed \$2.3 million in the prior-year period.

## Comparison of the years ended December 31, 2014 and 2013

## Performance Coatings

|  | 2014                   | 2013       | \$ Change   | %<br>Change | Change due to |           |             |        |
|--|------------------------|------------|-------------|-------------|---------------|-----------|-------------|--------|
|  |                        |            |             |             | Price         | Mix       | Currency    | Other  |
|  | (Dollars in thousands) |            |             |             |               |           |             |        |
| Segment net sales                        | \$ 588,538             | \$ 600,361 | \$ (11,823) | (2.0)%      | \$ (19,013)   | \$ 24,588 | \$ (17,398) | \$ —   |
| Segment gross profit                     | 131,043                | 134,138    | (3,095)     | (2.3)%      | (19,013)      | 4,300     | (2,167)     | 13,785 |
| Gross profit as a % of segment net sales | 22.3 %                 | 22.3 %     |             |             |               |           |             |        |



Net sales decreased in Performance Coatings compared with 2013, primarily due to lower sales of our porcelain enamel products of \$6.9 million, and our tile frits and glazes, and colors product lines of \$6.1 million and \$5.7 million, respectively. These declines were partially mitigated by increased sales of our digital inks product line of \$6.4 million. Other tile product line sales declined \$3.3 million. Net sales in 2014 included \$3.8 million for the month of December related to our acquisition of Vettriceramici. Sales were impacted by higher sales volumes of \$9.4 million, favorable mix of \$15.2 million, lower product pricing of \$19.0 million and unfavorable foreign currency impacts of \$17.4 million. Our product pricing continues to be impacted by competitive pressures in our digital inks product line. Gross profit decreased from 2013, and was driven by favorable sales volumes and mix of \$4.3 million, lower product pricing impacts of \$19.0 million, favorable raw material impacts of \$12.2 million, lower manufacturing costs of \$1.3 million and unfavorable foreign currency impacts of \$2.2 million

|                             | 2014                   | 2013       | \$ Change   | %<br>Change |
|-----------------------------|------------------------|------------|-------------|-------------|
|                             | (Dollars in thousands) |            |             |             |
| Segment net sales by Region |                        |            |             |             |
| Europe                      | \$ 297,324             | \$ 299,204 | \$ (1,880)  | (0.6) %     |
| Latin America               | 132,015                | 137,519    | (5,504)     | (4.0) %     |
| Asia Pacific                | 108,419                | 110,119    | (1,700)     | (1.5) %     |
| United States               | 50,780                 | 53,519     | (2,739)     | (5.1) %     |
| Total                       | \$ 588,538             | \$ 600,361 | \$ (11,823) | (2.0) %     |

Net sales in 2014 decreased \$11.8 million compared with 2013 due to lower sales in all regions. The decline in sales in Europe was attributable to lower sales of our porcelain enamel products, partially mitigated by higher sales of tile products, including Vettriceramici sales during December. The decline in sales in 2014 in Latin America, compared to 2013, was due to lower sales of our tile color and porcelain enamel products, partially mitigated by higher sales of digital inks products. The decline in Asia Pacific was

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driven by lower sales of tile products, primarily frits and glaze products, which was partially mitigated by higher sales of digital inks products. The decline in the United States was all attributable to lower sales of porcelain enamel products.

## Performance Colors and Glass

|   | 2014<br>(Dollars in thousands) | 2013       | \$ Change | %<br>Change | Change due to<br>Volume / |           |            |       |
|---|--------------------------------|------------|-----------|-------------|---------------------------|-----------|------------|-------|
|   |                                |            |           |             | Price                     | Mix       | Currency   | Other |
| Segment net sales<br>excluding precious<br>metals | \$ 367,637                     | \$ 346,426 | \$ 21,211 | 6.1 %       | \$ 2,603                  | \$ 20,734 | \$ (2,126) | \$ —  |
| Segment precious<br>metal sales                   | 40,037                         | 43,581     | (3,544)   | (8.1) %     |                           |           |            |       |
| Segment net sales                                 | 407,674                        | 390,007    | 17,667    | 4.5 %       |                           |           |            |       |
| Segment gross profit                              | 134,964                        | 112,825    | 22,139    | 19.6 %      | 2,603                     | 17,800    | (740)      | 2,476 |
| Gross profit as a %<br>of segment net sales       | 36.7 %                         | 32.6 %     |           |             |                           |           |            |       |

Net sales excluding precious metals increased \$21.2 million in 2014 compared with 2013, with increases in all of our product lines. Net sales excluding precious metals were impacted by higher sales volumes of \$21.8 million, unfavorable mix of \$1.1 million, higher product pricing of \$2.6 million and unfavorable foreign currency impacts of \$2.1 million. Gross profit increased in 2014, compared with 2013, due to favorable sales volumes and mix of \$17.8 million, higher product pricing impacts of \$2.6 million, unfavorable raw material impacts of \$6.7 million, lower manufacturing costs of \$9.2 million, and unfavorable foreign currency impacts of \$0.7 million.

|  | 2014<br>(Dollars in thousands) | 2013 | \$ Change | %<br>Change |
|--|--------------------------------|------|-----------|-------------|
|  |                                |      |           |             |

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|               |            |            |           |        |
|---------------|------------|------------|-----------|--------|
| Europe        | \$ 160,901 | \$ 160,859 | \$ 42     | 0.0 %  |
| United States | 119,707    | 108,532    | 11,175    | 10.3 % |
| Asia Pacific  | 60,004     | 57,316     | 2,688     | 4.7 %  |
| Latin America | 27,025     | 19,719     | 7,306     | 37.1 % |
| Total         | \$ 367,637 | \$ 346,426 | \$ 21,211 | 6.1 %  |

The increase in 2014 in net sales excluding precious metals of \$21.2 million compared with 2013 reflected higher sales in all regions and in all product lines.

Pigments, Powders and Oxides

|   | 2014<br>(Dollars in thousands) | 2013       | \$ Change   | %<br>Change | Change due to |             |          |          |
|---|--------------------------------|------------|-------------|-------------|---------------|-------------|----------|----------|
|   |                                |            |             |             | Volume /      | Price       | Mix      | Currency |
| Segment net sales excluding precious metals | \$ 109,477                     | \$ 145,073 | \$ (35,596) | (24.5)%     | \$ —          | \$ (35,156) | \$ (440) | \$ —     |
| Segment precious metal sales                | 5,937                          | 53,141     | (47,204)    | (88.8)%     |               |             |          |          |
| Segment net sales                           | 115,414                        | 198,214    | (82,800)    | (41.8)%     |               |             |          |          |
| Segment gross profit                        | 28,480                         | 36,235     | (7,755)     | (21.4)%     | —             | (15,142)    | (213)    | 7,600    |
| Gross profit as a % of segment net sales    | 26.01 %                        | 24.98 %    |             |             |               |             |          |          |

Net sales excluding precious metals decreased in 2014 compared with 2013, primarily due to the sale of our North American and Asian metal powders business and exit of solar pastes, which comprised approximately \$27.5 million of the decrease. The remainder of

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the decrease in net sales excluding precious metals of \$8.1 million was primarily due to lower sales of our surface polishing materials in 2014 compared with 2013. Gross profit declined in 2014 compared with 2013 and was primarily the result of exited and sold businesses, which contributed to \$6.0 million of gross profit in the prior year that did not recur in the current year. The decrease in gross profit in 2014 was due to lower sales volumes and mix of \$15.1 million, which was partially mitigated by favorable raw material impacts of \$2.6 million and lower manufacturing costs of \$5.0 million.

|   | 2014                   | 2013       | \$ Change   | %<br>Change |
|---|------------------------|------------|-------------|-------------|
|   | (Dollars in thousands) |            |             |             |
| Segment net sales excluding precious metals by Region |                        |            |             |             |
| United States   | \$ 72,025              | \$ 102,893 | \$ (30,868) | (30.0)%     |
| Europe  | 21,546                 | 20,834     | 712         | 3.4 %       |
| Asia Pacific  | 13,916                 | 16,362     | (2,446)     | (14.9)%     |
| Latin America   | 1,990                  | 4,984      | (2,994)     | (60.1)%     |
| Total   | \$ 109,477             | \$ 145,073 | \$ (35,596) | (24.5)%     |

The decrease in net sales excluding precious metals of \$35.6 million in 2014, compared with 2013, was due to lower sales in the United States, Latin America and Asia Pacific, which were partially mitigated by higher sales in Europe. The decline in sales in the United States and Asia Pacific was primarily driven by the sale of our North American and Asian metal powders business which contributed \$27.5 million in the prior year that did not recur. Also contributing to the decline in the U.S. was lower sales of our surface polishing materials. Partially mitigating the decline in Asia Pacific were higher sales of our pigments products. The decline in Latin America was driven by lower sales of our pigments products.

## Summary of Cash Flows for the years ended December 31, 2015, 2014, and 2013

|  | 2015                   | 2014       | 2013       |
|--|------------------------|------------|------------|
|  | (Dollars in thousands) |            |            |
| Net cash provided by operating activities                    | \$ 51,202              | \$ 60,473  | \$ 18,464  |
| Net cash (used for) provided by investing activities         | (244,600)              | 75,204     | 17,168     |
| Net cash provided by (used for) financing activities         | 119,726                | (18,143)   | (36,715)   |
| Effect of exchange rate changes on cash and cash equivalents | (8,448)                | (5,362)    | (165)      |
| (Decrease) increase in cash and cash equivalents             | \$ (82,120)            | \$ 112,172 | \$ (1,248) |

Operating activities. Cash flows from operating activities decreased \$9.3 million in 2015 compared to 2014. The change was driven by lower net income of \$23.1 million. The decrease was partially mitigated by reduced payments

associated with restructuring activities of \$9.8 million and by a cash inflows of \$12.2 million in 2015 related to working capital, compared to cash outflows of \$12.3 million in 2014.

Cash flows from operating activities increased \$42.0 million in 2014 compared to 2013. The primary drivers of the change were an increase of \$13.8 million in net income compared with 2013, as well as a reduction in payments associated with restructuring activities of \$11.8 million. Further, net income was impacted by significant non-cash charges during the year for the mark-to-market adjustment of our pension and other postretirement benefits liabilities and the extinguishment of our 7.875% Senior Notes, as well as gains on divestitures of \$124.0. The increases were partially mitigated by a cash outflow of \$12.3 million in 2014 related to working capital, which was a decline from the cash inflow of \$6.3 million in 2013.

Investing activities. Cash flows from investing activities decreased approximately \$319.8 million in 2015. The decrease was driven primarily by business acquisitions, net of cash acquired, of \$202.2 million in 2015, compared to cash used for business acquisitions in 2014 of \$115.6 million, partially offset by net proceeds from the sales of our North America-based Polymer Additives assets and Specialty Plastics business in 2014 of \$149.5 million and \$88.3 million, respectively. Capital expenditures decreased \$10.7 million in 2015, compared with 2014.

Cash flows from investing activities increased approximately \$58.0 million in 2014, compared with 2013. The increase in 2014 was driven primarily by net proceeds from the sales, partially offset by cash outflows for the acquisition of Vetrikeramici and to acquire certain commercial assets of a reseller of our porcelain enamel products in Turkey. Capital expenditures increased \$19.5 million in 2014, compared with 2013. The higher capital expenditures were costs incurred for the ongoing project at our Antwerp, Belgium facility.

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Financing activities. Cash flows from financing activities increased \$137.9 million in 2015, compared with 2014. The increase was primarily as a result of net borrowings on the revolving credit facility of \$170.0 million in 2015 compared to a repayment of \$9.2 million in 2014. Net borrowings in 2015 were primarily used to fund the acquisitions, the share repurchase program, and for other general business use. Further, we had a cash outflow of \$41.0 million in 2014, related to repayment of debt outstanding under our accounts receivable securitization program that expired during the year.

Cash flows from financing activities increased \$18.6 million in 2014, compared with 2013. The increase was due to net borrowings on our term loan facility of \$300.0 million, partially offset by the repayment of the 7.875% Senior Notes of \$260.5 million. Further, we had a cash outflow of \$44.4 million in 2014, a decrease of \$45.1 million compared with 2013, related to repayment of debt outstanding under our accounts receivable securitization program that expired during the year, as well as our revolving credit facility that was amended during 2014.

We have paid no dividends on our common stock since 2009.

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### Capital Resources and Liquidity

Major debt instruments that were outstanding during 2015 are described below.

#### Credit Facility

On July 31, 2014, the Company entered into a new credit facility (the “Credit Facility”) with a group of Lenders to refinance the majority of its then outstanding debt, as discussed below. The Credit Facility consists of a \$200 million secured revolving line of credit with a term of five years and a \$300 million secured term loan facility with a term of seven years. The Credit Facility replaces the prior \$250 million revolving credit facility and provided funding to repurchase the 7.875% Senior Notes. Subject to certain conditions, the Company can request up to \$200 million of additional commitments under the Credit Facility, though the lenders are not required to provide such additional commitments. In addition, up to \$100 million of the revolving line of credit will be available to certain of the Company’s subsidiaries in the form of revolving loans denominated in Euros.

Certain of the Company’s U.S. subsidiaries have guaranteed the Company’s obligations under the Credit Facility and such obligations are secured by (a) substantially all of the personal property of the Company and the U.S. subsidiary guarantors and (b) a pledge of 100% of the stock of most of the Company’s U.S. subsidiaries and 65% of most of the stock of the Company’s first tier foreign subsidiaries.

**Interest Rate – Term Loan:** The interest rates applicable to the term loans will be, at the Company’s option, equal to either a base rate or a London Interbank Offered Rate (“LIBOR”) rate plus, in both cases, an applicable margin.

- The base rate will be the highest of (i) the federal funds rate plus 0.50%, (ii) PNC’s prime rate or (iii) the daily LIBOR rate plus 1.00%.
  - The applicable margin for base rate loans is 2.25%.
  - The LIBOR rate will be set as quoted by Bloomberg and shall not be less than 0.75%.
  - The applicable margin for LIBOR rate loans is 3.25%.
  - For LIBOR rate loans, the Company may choose to set the duration on individual borrowings for periods of one, two, three or six months, with the interest rate based on the applicable LIBOR rate for the corresponding duration.
- At December 31, 2015, the Company had borrowed \$296.3 million under the term loan facility at an annual rate of 4.0%. There were no additional borrowings available under the term loan facility.

**Interest Rate – Revolving Credit Line:** The interest rates applicable to loans under the revolving credit line will be, at the Company’s option, equal to either a base rate or a LIBOR rate plus an applicable variable margin. The variable margin will be based on the ratio of (a) the Company’s total consolidated debt outstanding at such time to (b) the Company’s consolidated EBITDA computed for the period of four consecutive fiscal quarters most recently ended.

- The base rate will be the highest of (i) the federal funds rate plus 0.50%, (ii) PNC’s prime rate or (iii) the daily LIBOR rate plus 1.00%.
  - The applicable margin for base rate loans will vary between 1.50% and 2.00%.
  - The LIBOR rate will be set as quoted by Bloomberg for U.S. Dollars.
  - The applicable margin for LIBOR Rate Loans will vary between 2.50% and 3.00%.
  - For LIBOR rate loans, the Company may choose to set the duration on individual borrowings for periods of one, two, three or six months, with the interest rate based on the applicable LIBOR rate for the corresponding duration.
- At December 31, 2015, the Company had borrowed \$170.0 million under the revolving credit facilities at a weighted average interest rate of 3.1%. The borrowings on the revolving credit line were used to fund the acquisitions, the

share repurchase program, and for other general business use. After reductions for outstanding letters of credit secured by these facilities, we had \$25.6 million of additional borrowings available at December 31, 2015.

The Credit Facility contains customary restrictive covenants including, but not limited to, limitations on use of loan proceeds, limitations on the Company's ability to pay dividends and repurchase stock, limitations on acquisitions and dispositions, and limitations



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on certain types of investments. The Credit Facility also contains standard provisions relating to conditions of borrowing and customary events of default, including the non-payment of obligations by the Company and the bankruptcy of the Company.

Under the secured revolving credit facility, we are subject to certain financial covenants. The covenants include requirements for a leverage ratio and an interest coverage ratio.

If an event of default occurs, all amounts outstanding under the Credit Facility may be accelerated and become immediately due and payable. At December 31, 2015, we were in compliance with the covenants of the Credit Facility.

### Off Balance Sheet Arrangements

Consignment and Customer Arrangements for Precious Metals. We use precious metals, primarily silver, in the production of some of our products. We obtain most precious metals from financial institutions under consignment agreements (generally referred to as our precious metals consignment program). The financial institutions retain ownership of the precious metals and charge us fees based on the amounts we consign and the period of consignment. These fees were \$0.8 million, \$0.8 million and \$3.0 million for 2015, 2014, and 2013 respectively. We had on hand precious metals owned by participants in our precious metals consignment program of \$20.5 million at December 31, 2015 and \$26.6 million at December 31, 2014, measured at fair value based on market prices for identical assets and net of credits.

The consignment agreements under our precious metals program involve short-term commitments that typically mature within 30 to 90 days of each transaction and are typically renewed on an ongoing basis. As a result, the Company relies on the continued willingness of financial institutions to participate in these arrangements to maintain this source of liquidity. On occasion, we have been required to deliver cash collateral. While no deposits were outstanding at December 31, 2015, or December 31, 2014, we may be required to furnish cash collateral in the future based on the quantity and market value of the precious metals under consignment and the amount of collateral-free lines provided by the financial institutions. The amount of cash collateral required is subject to review by the financial institutions and can be changed at any time at their discretion, based in part on their assessment of our creditworthiness.

### Bank Guarantees and Standby Letters of Credit.

At December 31, 2015, the Company and its subsidiaries had bank guarantees and standby letters of credit issued by financial institutions that totaled \$8.1 million. These agreements primarily relate to Ferro's insurance programs, foreign energy purchase contracts and foreign tax payments.

### Other Financing Arrangements

We maintain other lines of credit to provide global flexibility for Ferro's short-term liquidity requirements. These facilities are uncommitted lines for our international operations and totaled \$8.0 million at December 31, 2015. We had \$7.3 million of additional borrowings available under these lines at December 31, 2015.

### Liquidity Requirements

Our primary sources of liquidity are available cash and cash equivalents, available lines of credit under the Credit Facility, and cash flows from operating activities. As of December 31, 2015, we had \$58.4 million of cash and cash equivalents. Substantially all of our cash and cash equivalents were held by foreign subsidiaries. Cash generated in the U.S. is generally used to pay down amounts outstanding under our revolving credit facility and for general corporate purposes. If needed, we could repatriate the majority of cash held by foreign subsidiaries without the need to accrue and pay U.S. income taxes. We do not anticipate a liquidity need requiring such repatriation of these funds to the U.S.

Our liquidity requirements primarily include debt service, purchase commitments, labor costs, working capital requirements, restructuring expenditures, capital investments, precious metals cash collateral requirements, and postretirement obligations. We expect to meet these requirements in the long term through cash provided by operating activities and availability under existing credit facilities or other financing arrangements. Cash flows from operating activities are primarily driven by earnings before noncash charges and changes in working capital needs. In 2015, cash flows from financing and operating activities were used to fund our investing activities. Additionally, we used the borrowings available under the Credit Facility to fund the acquisitions, the share repurchase program, and for other general business use. We had additional borrowing capacity \$32.9 million at December 31, 2015, available under various credit

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facilities, primarily our revolving credit facility. Subsequent to December 31, 2015, the Company increased the commitment under the Credit Facility by \$100 million and used a portion of the increase to repay \$50 million of the term loan. Refer to Note 23 for additional details.

Our credit facilities contain a number of restrictive covenants, including those described in more detail in Note 8 to the consolidated financial statements under Item 8 of this Annual Report on Form 10-K. These covenants include customary operating restrictions, including, but not limited to, limitations on use of loan proceeds, limitations on the Company's ability to pay dividends and repurchase stock, limitations on acquisitions and dispositions, and limitations on certain types of investments. We are also subject to customary financial covenants under our credit facilities, including a leverage ratio and an interest coverage ratio. These covenants under our credit facilities restrict the amount of our borrowings, reducing our flexibility to fund ongoing operations and strategic initiatives. These facilities are described in more detail in "Capital Resources and Liquidity" under Item 7 and in Note 8 to the consolidated financial statements under Item 8 of this Annual Report on Form 10-K.

The most critical of these ratios is the leverage ratio for the revolving credit facility. As of December 31, 2015, we were in compliance with our maximum leverage ratio covenant of 3.75x as our actual ratio was 3.07x, providing \$28.2 million of EBITDA cushion on the leverage ratio, as defined within our Credit Facility. To the extent that economic conditions in key markets deteriorate or we are unable to meet our business projections and EBITDA falls below approximately \$130 million for rolling four quarters, based on reasonably consistent debt levels with those as of December 31, 2015, we could become unable to maintain compliance with our leverage ratio covenant. In such case, our lenders could demand immediate payment of outstanding amounts and we would need to seek alternate financing sources to pay off such debts and to fund our ongoing operations. Such financing may not be available on favorable terms, if at all.

Difficulties experienced in global capital markets could affect the ability or willingness of counterparties to perform under our various lines of credit, forward contracts, and precious metals program. These counterparties are major, reputable, multinational institutions, all having investment-grade credit ratings, except for one, which is not rated. Accordingly, we do not anticipate counterparty default. However, an interruption in access to external financing could adversely affect our business prospects and financial condition.

We assess on an ongoing basis our portfolio of businesses, as well as our financial and capital structure, to ensure that we have sufficient capital and liquidity to meet our strategic objectives. As part of this process, from time to time we evaluate the possible divestiture of businesses that are not critical to our core strategic objectives and, where appropriate, pursue the sale of such businesses and assets such as sales we completed in 2014 and 2013. We also evaluate and pursue acquisition opportunities that we believe will enhance our strategic position such as the acquisitions we completed in 2015 and 2014. Generally, we publicly announce material divestiture and acquisition transactions only when we have entered into definitive agreements relating to those transactions.

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The Company's aggregate amount of contractual obligations for the next five years and thereafter is set forth below:

|  | 2016                   | 2017      | 2018      | 2019       | 2020      | Thereafter | Totals     |
|--|------------------------|-----------|-----------|------------|-----------|------------|------------|
|  | (Dollars in thousands) |           |           |            |           |            |            |
| Loans Payable (1)                                  | \$ 2,749               | \$ —      | \$ —      | \$ —       | \$ —      | \$ —       | \$ 2,749   |
| Long-term debt (2)                                 | 4,697                  | 4,697     | 4,697     | 173,826    | 3,586     | 283,986    | 475,489    |
| Interest (3)                                       | 59                     | 59        | 59        | —          | —         | —          | 177        |
| Operating lease obligations                        | 8,807                  | 6,790     | 5,806     | 5,220      | 4,180     | 6,657      | 37,460     |
| Purchase commitments (4)                           | 27,825                 | 10,579    | 7,565     | 6,891      | 6,891     | 10,190     | 69,941     |
| Taxes (5)  | 8,628                  | —         | —         | —          | —         | —          | 8,628      |
| Retirement and other<br>postemployment benefits(6) | 8,544                  | 8,357     | —         | —          | —         | —          | 16,901     |
|  | \$ 61,309              | \$ 30,482 | \$ 18,127 | \$ 185,937 | \$ 14,657 | \$ 300,833 | \$ 611,345 |

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- (1) Loans Payable includes our loans payable to banks.
  - (2) Long-term debt excludes imputed interest and executory costs on capitalized lease obligations and unamortized issuance costs on the term loan facility.
  - (3) Interest represents only contractual payments for fixed-rate debt.
  - (4) Purchase commitments are noncancelable contractual obligations for raw materials and energy.
  - (5) We have not projected payments past 2016 due to uncertainties in estimating the amount and period of any payments. The amount above relates to our current income tax liability as of December 31, 2015. We have \$32.3 million in gross liabilities related to unrecognized tax benefits, including \$1.6 million of accrued interest and penalties that are not included in the above table since we cannot reasonably predict the timing of cash settlements with various taxing authorities.
  - (6) The funding amounts are based on the minimum contributions required under our various plans and applicable regulations in each respective country. We have not projected contributions past 2017 due to uncertainties regarding the assumptions involved in estimating future required contributions.

### Critical Accounting Policies

When we prepare our consolidated financial statements we are required to make estimates and assumptions that affect the amounts we report in the consolidated financial statements and footnotes. We consider the policies discussed below to be more critical than other policies because their application requires our most subjective or complex judgments. These estimates and judgments arise because of the inherent uncertainty in predicting future events. Management has discussed the development, selection and disclosure of these policies with the Audit Committee of the Board of Directors.

### Revenue Recognition

We recognize sales typically when we ship goods to our customers and when all of the following criteria are met:

- Persuasive evidence of an arrangement exists;
- The selling price is fixed or determinable;
- Collection is reasonably assured; and
- Title and risk of loss has passed to our customers.

In order to ensure the revenue recognition in the proper period, we review material sales contracts for proper cut-off based upon the business practices and legal requirements of each country. For sales of products containing precious metals, we report revenues gross along with their corresponding cost of sales to arrive at gross profit. We record revenues this way because we act as the principal in the transactions into which we enter.

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### Restructuring and Cost Reduction Programs

In recent years, we have developed and initiated several restructuring programs across a number of our business segments with the objectives of leveraging our global scale, realigning and lowering our cost structure, and optimizing capacity utilization. The programs are primarily associated with North America, Europe and Asia Pacific. Management continues to evaluate our businesses, and therefore, there may be additional provisions for new initiatives, as well as changes in estimates to amounts previously recorded, as payments are made or actions are completed.

Restructuring charges include both termination benefits and asset writedowns. We estimate accruals for termination benefits based on various factors including length of service, contract provisions, local legal requirements, projected final service dates, and salary levels. We also analyze the carrying value of long-lived assets and record estimated accelerated depreciation through the anticipated end of the useful life of the assets affected by the restructuring or record an asset impairment. In all likelihood, this accelerated depreciation will result in reducing the net book value of those assets to zero at the date operations cease. While we believe that changes to our estimates are unlikely, the accuracy of our estimates depends on the successful completion of numerous actions. Changes in our estimates could increase our restructuring costs to such an extent that it could have a material impact on the Company's results of operations, financial position, or cash flows. Other events, such as negotiations with unions and works councils, may also delay the resulting cost savings.

### Accounts Receivable and the Allowance for Doubtful Accounts

Ferro sells its products to customers in diversified industries throughout the world. No customer or related group of customers represents greater than 10% of net sales or accounts receivable. We perform ongoing credit evaluations of our customers and require collateral principally for export sales, when industry practices allow and as market conditions dictate, subject to our ability to negotiate secured terms relative to competitive offers. We regularly analyze significant customer accounts and provide for uncollectible accounts based on historical experience, customer payment history, the length of time the receivables are past due, the financial health of the customer, economic conditions, and specific circumstances, as appropriate. Changes in these factors could result in additional allowances. Customer accounts we conclude to be uncollectible or to require excessive collection costs are written off against the allowance for doubtful accounts. Historically, write-offs of uncollectible accounts have been within our expectations.

### Goodwill

We review goodwill for impairment each year using a measurement date of October 31st or more frequently in the event of an impairment indicator. We annually, or more frequently as warranted, evaluate the appropriateness of our reporting units utilizing operating segments as the starting point of our analysis. In the event of a change in our reporting units, we would allocate goodwill based on the relative fair value. We estimate the fair values of the reporting units associated with these assets using the average of both the income approach and the market approach, which we believe provides a reasonable estimate of the reporting units' fair values, unless facts and circumstances exist that indicate more representative fair values. The income approach uses projected cash flows attributable to the reporting units over their useful lives and allocates certain corporate expenses to the reporting units. We use historical results, trends and our projections of market growth, internal sales efforts and anticipated cost structure assumptions to estimate future cash flows. Using a risk-adjusted, weighted-average cost of capital, we discount the cash flow projections to the measurement date. The market approach estimates a price reasonably expected to be paid by a market participant in the purchase of similar businesses. If the fair value of any reporting unit was determined to be less than its carrying value, we would proceed to the second step and obtain comparable market values or independent

appraisals of its assets and liabilities to determine the amount of any impairment.

The significant assumptions and ranges of assumptions we used in our impairment analyses of goodwill at October 31, 2015 and 2014, were as follows:

| Significant Assumptions          | 2015            | 2014           |
|----------------------------------|-----------------|----------------|
| Weighted-average cost of capital | 11.5% - 12.75 % | 12.0% - 12.5 % |
| Residual growth rate             | 3.0 %           | 3.0 %          |

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Our estimates of fair value can be adversely affected by a variety of factors. Reductions in actual or projected growth or profitability at our reporting units due to unfavorable market conditions or significant increases in cost structure could lead to the impairment of any related goodwill. Additionally, an increase in inflation, interest rates or the risk-adjusted, weighted-average cost of capital could also lead to a reduction in the fair value of one or more of our reporting units and therefore lead to the impairment of goodwill.

Based on our 2015 annual impairment test performed as of October 31, 2015, the fair values of the remaining reporting units tested for impairment exceeded the carrying values of the respective reporting units by amounts ranging from 11% to 381% at the 2015 measurement date. The lowest cushion relates to goodwill associated with the Performance Coatings operating segment, which had a goodwill balance of \$43.5 million at December 31, 2015. A future potential impairment is possible for any of these reporting units if actual results are materially less than forecasted results. Some of the factors that could negatively affect our cash flows and, as a result, not support the carrying values of our reporting units are: new environmental regulations or legal restrictions on the use of our products that would either reduce our product revenues or add substantial costs to the manufacturing process, thereby reducing operating margins; new technologies that could make our products less competitive or require substantial capital investment in new equipment or manufacturing processes; and substantial downturns in economic conditions.

### Long-Lived Asset Impairment

The Company's long-lived assets include property, plant and equipment, and intangible assets. We review property, plant and equipment and intangible assets for impairment whenever events or circumstances indicate that their carrying values may not be recoverable. The following are examples of such events or changes in circumstances:

- An adverse change in the business climate or market price of a long-lived asset or asset group;
- An adverse change in the extent or manner in which a long-lived asset or asset group is used or in its physical condition;
- Current operating losses for a long-lived asset or asset group combined with a history of such losses or projected or forecasted losses that demonstrate that the losses will continue; or
- A current expectation that, more likely than not, a long-lived asset or asset group will be sold or otherwise significantly disposed of before the end of its previously estimated useful life.

The carrying amount of property, plant and equipment and intangible assets is not recoverable if the carrying value of the asset group exceeds the sum of the undiscounted cash flows expected to result from the use and eventual disposition of the asset group. In the event of impairment, we recognize a loss for the excess of the recorded value over fair value. The long-term nature of these assets requires the estimation of cash inflows and outflows several years into the future and only takes into consideration technological advances known at the time of review.

### Income Taxes

The breadth of our operations and complexity of income tax regulations require us to assess uncertainties and make judgments in estimating the ultimate amount of income taxes we will pay. Our income tax expense, deferred tax assets and liabilities, and reserves for unrecognized tax benefits reflect management's best assessment of estimated current and future taxes to be paid. The final income taxes we pay are based upon many factors, including existing income tax laws and regulations, negotiations with taxing authorities in various jurisdictions, outcomes of tax litigation, and resolution of disputes arising from federal, state and international income tax audits. The resolution of these uncertainties may result in adjustments to our income tax assets and liabilities in the future.



Deferred income taxes result from differences between the financial and tax basis of our assets and liabilities. We adjust our deferred income tax assets and liabilities for changes in income tax rates and income tax laws when changes are enacted. We record valuation allowances to reduce deferred income tax assets when it is more likely than not that a tax benefit will not be realized. Significant judgment is required in evaluating the need for and the magnitude of appropriate valuation allowances against deferred income tax assets. The realization of these assets is dependent on generating future taxable income, our ability to carry back or carry forward net operating losses and credits to offset tax liabilities, as well as successful implementation of various tax strategies to generate tax where net operating losses or credit carryforwards exist. In evaluating our ability to realize the deferred income tax assets, we rely principally on the reversal of existing temporary differences, the availability of tax planning strategies, and forecasted income.

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We recognize a tax benefit from an uncertain tax position when it is more likely than not that the position will be sustained upon examination, including resolutions of any related appeals or litigation processes, based on the technical merits. Our estimate of the potential outcome of any uncertain tax positions is subject to management's assessment of relevant risks, facts, and circumstances existing at that time. We record a liability for the difference between the benefit recognized and measured based on a more-likely-than-not threshold and the tax position taken or expected to be taken on the tax return. To the extent that our assessment of such tax positions changes, the change in estimate is recorded in the period in which the determination is made. We report tax-related interest and penalties as a component of income tax expense.

### Derivative Financial Instruments

We use derivative financial instruments in the normal course of business to manage our exposure to fluctuations in interest rates, foreign currency exchange rates, commodity prices, and precious metal prices. The accounting for derivative financial instruments can be complex and can require significant judgment. Generally, the derivative financial instruments that we use are not complex, and observable market-based inputs are available to measure their fair value. We do not engage in speculative transactions for trading purposes. Financial instruments, including derivative financial instruments, expose us to counterparty credit risk for nonperformance. We manage our exposure to counterparty credit risk through minimum credit standards and procedures to monitor concentrations of credit risk. We enter into these derivative financial instruments with major, reputable, multinational financial institutions. Accordingly, we do not anticipate counter-party default. We continuously evaluate the effectiveness of derivative financial instruments designated as hedges to ensure that they are highly effective. In the event the hedge becomes ineffective, we discontinue hedge treatment. Except as noted below, we do not expect any changes in our risk policies or in the nature of the transactions we enter into to mitigate those risks.

We manage foreign currency risks in a wide variety of foreign currencies principally by entering into forward contracts to mitigate the impact of currency fluctuations on transactions arising from international trade. Our objective in entering into these forward contracts is to preserve the economic value of nonfunctional currency cash flows. Our principal foreign currency exposures relate to the Euro, the British Pound Sterling, the Japanese Yen, and the Chinese Yuan. We mark these forward contracts to fair value based on market prices for comparable contracts and recognize the resulting gains or losses as other income or expense from foreign currency transactions.

Precious metals (primarily silver, gold, platinum and palladium) represent a significant portion of raw material costs in our electronics products. When we enter into a fixed price sales contract at the customer's request to establish the price for the precious metals content of the order, we also enter into a forward purchase arrangement with a precious metals supplier to completely cover the value of the precious metals content. Our current precious metal contracts are designated as normal purchase contracts, which are not marked to market.

We also purchase portions of our energy requirements, including natural gas and electricity, under fixed price contracts to reduce the volatility of cost changes. Our current energy contracts are designated as normal purchase contracts, which are not marked to market.

### Pension and Other Postretirement Benefits

We sponsor defined benefit plans in the U.S. and many countries outside the U.S., and we also sponsor retiree medical benefits for a segment of our salaried and hourly work force within the U.S. The U.S. pension plans and retiree medical plans represent approximately 81% of pension plan assets, 70% of benefit obligations and 30% of net periodic pension income.

The assumptions we use in actuarial calculations for these plans have a significant impact on benefit obligations and annual net periodic benefit costs. We meet with our actuaries annually to discuss key economic assumptions used to develop these benefit obligations and net periodic costs.

We determine the discount rate for the U.S. pension and retiree medical plans based on a bond model. Using the pension plans' projected cash flows, the bond model considers all possible bond portfolios that produce matching cash flows and selects the portfolio with the highest possible yield. These portfolios are based on bonds with a quality rating of AA or better under either Moody's Investor Services, Inc. or Standard & Poor's Rating Group, but exclude certain bonds, such as callable bonds, bonds with small amounts outstanding, and bonds with unusually high or low yields. The discount rates for the non-U.S. plans are based on a yield curve method, using AA-rated bonds applicable in their respective capital markets. The duration of each plan's liabilities is used to select the rate from the yield curve corresponding to the same duration.

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For the market-related value of plan assets, we use fair value, rather than a calculated value. The market-related value recognizes changes in fair value in a systematic and rational manner over several years. We calculate the expected return on assets at the beginning of the year for defined benefit plans as the weighted-average of the expected return for the target allocation of the principal asset classes held by each of the plans. In determining the expected returns, we consider both historical performance and an estimate of future long-term rates of return. The Company consults with and considers the opinion of its actuaries in developing appropriate return assumptions. Our target asset allocation percentages are 35% fixed income, 60% equity, and 5% other investments for U.S. plans and 75% fixed income, 24% equity, and 1% other investments for non-U.S. plans. In 2015, actual return on plan assets, were lower than the expected return. In 2014, investment returns on average plan assets were approximately 7% within U.S. plans and 20% within non-U.S. plans. Future actual pension expense will depend on future investment allocation and performance, changes in future discount rates and various other factors related to the population of participants in the Company's pension plans.

All other assumptions are reviewed periodically by our actuaries and us and may be adjusted based on current trends and expectations as well as past experience in the plans. During the fourth quarter of 2014, the Company adopted the use of new mortality tables within its calculation assumptions, which had a one-time impact of increasing the liability. The new mortality tables reflect underlying increases in life expectancy of participants, thus driving longer benefit payment periods. The impact of the change in mortality assumption on the U.S. pension liability was an increase of the liability of approximately \$18 million.

The following table provides the sensitivity of net annual periodic benefit costs for our pension plans, including a U.S. nonqualified retirement plan, and the retiree medical plan to a 25-basis-point decrease in both the discount rate and asset return assumption:

|                           | 25 Basis Point<br>Decrease in<br>Discount Rate | 25 Basis Point<br>Decrease in<br>Asset Return<br>Assumption |
|---------------------------|--|---|
|                           | (Dollars in thousands)                         |   |
| U.S. pension plans        | \$ (424)                                       | \$ 697  |
| U.S. retiree medical plan | (34)   | N/A   |
| Non-U.S. pension plans    | (52)   | 22  |
| Total                     | \$ (510)                                       | \$ 719  |

The following table provides the rates used in the assumptions and the changes between 2015 and 2014:

|   | 2015   | 2014   | Change   |
|---|--------|--------|----------|
| Discount rate used to measure the benefit cost:       |        |        |          |
| U.S. pension plans                                    | 4.25 % | 5.25 % | (1.00) % |
| U.S. retiree medical plan                             | 3.95 % | 4.90 % | (0.95) % |
| Non-U.S. pension plans                                | 2.72 % | 4.12 % | (1.40) % |
| Discount rate used to measure the benefit obligation: |        |        |          |
| U.S. pension plans                                    | 4.70 % | 4.25 % | 0.45 %   |
| U.S. retiree medical plan                             | 4.50 % | 3.95 % | 0.55 %   |
| Non-U.S. pension plans                                | 3.12 % | 2.72 % | 0.40 %   |
| Expected return on plan assets:                       |        |        |          |
| U.S. pension plans                                    | 8.20 % | 8.20 % | — %      |
| Non-U.S. pension plans                                | 3.50 % | 4.44 % | (0.94) % |

Our overall net periodic benefit cost for all defined benefit plans was \$1.5 million in 2015 and \$84.4 million in 2014. The change in 2014 is mainly the result of mark to market actuarial net losses in 2014.

For 2016, assuming expected returns on plan assets and no actuarial gains or losses, we expect our overall net periodic benefit cost to be approximately \$0.1 million, compared with income of approximately \$7.6 million in 2015 on a comparable basis.

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Inventories

We value inventory at the lower of cost or market, with cost determined utilizing the first-in, first-out (FIFO) method. We periodically evaluate the net realizable value of inventories based primarily upon their age, but also upon assumptions of future usage in production, customer demand and market conditions. Inventories have been reduced to the lower of cost or realizable value by allowances for slow moving or obsolete goods. If actual circumstances are less favorable than those projected by management in its evaluation of the net realizable value of inventories, additional write-downs may be required. Slow moving, excess or obsolete materials are specifically identified and may be physically separated from other materials, and we rework or dispose of these materials as time and manpower permit.

Environmental Liabilities

Our manufacturing facilities are subject to a broad array of environmental laws and regulations in the countries in which they are located. The costs to comply with complex environmental laws and regulations are significant and will continue for the foreseeable future. We expense these recurring costs as they are incurred. While these costs may increase in the future, they are not expected to have a material impact on our financial position, liquidity or results of operations.

We also accrue for environmental remediation costs when it is probable that a liability has been incurred and we can reasonably estimate the amount. We determine the timing and amount of any liability based upon assumptions regarding future events. Inherent uncertainties exist in such evaluations primarily due to unknown conditions, changing governmental regulations and legal standards regarding liability, and evolving technologies. We adjust these liabilities periodically as remediation efforts progress or as additional technical or legal information becomes available.

Impact of Newly Issued Accounting Pronouncements

Refer to Note 2 to the consolidated financial statements under Item 8 of this Annual Report on Form 10-K for a discussion of accounting standards we recently adopted or will be required to adopt.

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## Item 7A — Quantitative and Qualitative Disclosures about Market Risk

The primary objective of the following information is to provide forward-looking quantitative and qualitative information about our exposure to instruments that are sensitive to fluctuations in interest rates, foreign currency exchange rates, and costs of raw materials and energy.

Our exposure to interest rate risk arises from our debt portfolio. We manage this risk by controlling the mix of fixed versus variable-rate debt after considering the interest rate environment and expected future cash flows. Our objective is to limit variability in earnings, cash flows and overall borrowing costs caused by changes in interest rates, while preserving operating flexibility.

We operate internationally and enter into transactions denominated in foreign currencies. These transactions expose us to gains and losses arising from exchange rate movements between the dates foreign currencies are recorded and the dates they are settled. We manage this risk by entering into forward currency contracts that substantially offset these gains and losses.

We are subject to cost changes with respect to our raw materials and energy purchases. We attempt to mitigate raw materials cost increases through product reformulations, price increases, and productivity improvements. We enter into forward purchase arrangements with precious metals suppliers to completely cover the value of the precious metals content of fixed price sales contracts. These agreements are designated as normal purchase contracts, which are not marked to market, and had purchase commitments totaling \$1.1 million at December 31, 2015. In addition, we purchase portions of our natural gas, electricity, and oxygen requirements under fixed price contracts to reduce the volatility of these costs. These energy contracts are designated as normal purchase contracts, which are not marked to market, and had purchase commitments totaling \$68.9 million at December 31, 2015.

The notional amounts, carrying amounts of assets (liabilities), and fair values associated with our exposure to these market risks and sensitivity analysis about potential gains (losses) resulting from hypothetical changes in market rates are presented below:

|  | December<br>31,<br>2015 | December<br>31,<br>2014 |
|--|-------------------------|-------------------------|
|  | (Dollars in thousands)  |                         |
| Variable-rate debt:  |                         |                         |
| Carrying amount  | \$ 461,717              | \$ 293,906              |
| Fair value   | 466,571                 | 310,453                 |
| Change in annual interest expense from 1% change in interest rates | 4,690                   | 2,993                   |
| Fixed-rate debt:   |                         |                         |
| Carrying amount  | 4,610                   | 3,504                   |
| Fair value   | 3,956                   | 2,861                   |
| Change in fair value from 1% increase in interest rates            | NM                      | NM                      |

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|   |          |         |
|---|----------|---------|
| Change in fair value from 1% decrease in interest rates   | NM       | NM      |
| Foreign currency forward contracts:                       |          |         |
| Notional amount   | 338,418  | 145,920 |
| Carrying amount and fair value                            | (1,207)  | 713     |
| Change in fair value from 10% appreciation of U.S. dollar | 19,814   | 1,292   |
| Change in fair value from 10% depreciation of U.S. dollar | (24,217) | (1,579) |
| NM -- Not meaningful                                      |          |         |



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Item 8 — Financial Statements and Supplementary Data

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Shareholders of Ferro Corporation

Cleveland, Ohio

We have audited the accompanying consolidated balance sheets of Ferro Corporation and subsidiaries (the “Company”) as of December 31, 2015 and 2014, and the related consolidated statements of operations, comprehensive (loss) income, equity, and cash flows for each of the three years in the period ended December 31, 2015. Our audits also included the financial statement schedule listed in the Index at Item 15. These financial statements and financial statement schedule are the responsibility of the Company's management. Our responsibility is to express an opinion on the financial statements and financial statement schedule based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, such consolidated financial statements present fairly, in all material respects, the financial position of Ferro Corporation and subsidiaries as of December 31, 2015 and 2014, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 2015, in conformity with accounting principles generally accepted in the United States of America. Also, in our opinion, such financial statement schedule, when considered in relation to the basic consolidated financial statements taken as a whole, presents fairly, in all material respects, the information set forth therein.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the Company's internal control over financial reporting as of December 31, 2015, based on the criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission, and our report dated February 24, 2016, expressed an unqualified opinion on the Company's internal control over financial reporting.

/s/ Deloitte & Touche LLP

Cleveland, Ohio

February 24, 2016



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## FERRO CORPORATION AND SUBSIDIARIES

## CONSOLIDATED STATEMENTS OF OPERATIONS

|   | Years Ended December 31,                         |              |              |
|---|--|--------------|--------------|
|   | 2015   | 2014         | 2013         |
|   | (Dollars in thousands, except per share amounts) |              |              |
| Net sales   | \$ 1,075,341                                     | \$ 1,111,626 | \$ 1,188,582 |
| Cost of sales   | 773,661  | 826,541      | 910,910      |
| Gross profit  | 301,680  | 285,085      | 277,672      |
| Selling, general and administrative expenses  | 216,899  | 286,762      | 150,753      |
| Restructuring and impairment charges  | 9,655  | 8,849        | 40,929       |
| Other expense (income):   |  |              |              |
| Interest expense  | 15,163   | 16,263       | 20,152       |
| Interest earned   | (363)  | (118)        | (271)        |
| Loss on extinguishment of debt  | —  | 14,384       | —            |
| Foreign currency losses, net  | 4,495  | 1,159        | 4,205        |
| Miscellaneous expense (income), net   | 1,048  | 622          | (16,286)     |
| Income (loss) before income taxes   | 54,783   | (42,836)     | 78,190       |
| Income tax (benefit) expense  | (45,100)   | (34,227)     | 14,285       |
| Income (loss) from continuing operations  | 99,883   | (8,609)      | 63,905       |
| (Loss) income from discontinued operations, net of income taxes   | (36,779)   | 94,840       | 8,540        |
| Net income  | 63,104   | 86,231       | 72,445       |
| Less: Net (loss) income attributable to noncontrolling interests  | (996)  | 160          | 503          |
| Net income attributable to Ferro Corporation common shareholders  | \$ 64,100  | \$ 86,071    | \$ 71,942    |
| Amounts attributable to Ferro Corporation:  |  |              |              |
| Income (loss) from continuing operations, net of income tax   | 100,879  | (8,769)      | 63,402       |
| (Loss) income from discontinued operations, net of income tax   | (36,779)   | 94,840       | 8,540        |
| Income attributable to Ferro Corporation  | \$ 64,100  | \$ 86,071    | \$ 71,942    |
| Weighted-average common shares outstanding  | 86,718   | 86,920       | 86,484       |
| Incremental common shares attributable to performance shares, deferred stock units, restricted stock units, and stock options | 1,715  | —            | 1,013        |
| Weighted-average diluted shares outstanding   | 88,433   | 86,920       | 87,497       |
| Earnings (loss) per share attributable to Ferro Corporation common shareholders:  |  |              |              |
| Basic earnings (loss):  |  |              |              |
| Continuing operations   | \$ 1.16  | \$ (0.10)    | \$ 0.73      |
| Discontinued operations   | (0.42)   | 1.09         | 0.10         |
|   | \$ 0.74  | \$ 0.99      | \$ 0.83      |
| Diluted earnings (loss):  |  |              |              |
| Continuing operations   | \$ 1.14  | \$ (0.10)    | \$ 0.72      |
| Discontinued operations   | (0.42)   | 1.09         | 0.10         |

\$ 0.72

\$ 0.99

\$ 0.82

See accompanying notes to consolidated financial statements.

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## FERRO CORPORATION AND SUBSIDIARIES

## CONSOLIDATED STATEMENTS OF COMPREHENSIVE (LOSS) INCOME

|  | Years Ended December 31, |           |           |
|--|--------------------------|-----------|-----------|
|  | 2015                     | 2014      | 2013      |
|  | (Dollars in thousands)   |           |           |
| Net income   | \$ 63,104                | \$ 86,231 | \$ 72,445 |
| Other comprehensive loss, net of income tax:                               |                          |           |           |
| Foreign currency translation loss  | (40,801)                 | (29,415)  | (7,230)   |
| Postretirement benefit liabilities loss                                    | (77)                     | (1,054)   | (705)     |
| Other  | —                        | —         | 7         |
| Other comprehensive loss, net of income tax                                | (40,878)                 | (30,469)  | (7,928)   |
| Total comprehensive income   | 22,226                   | 55,762    | 64,517    |
| Less: Comprehensive (loss) income attributable to noncontrolling interests | (2,361)                  | (11)      | 732       |
| Comprehensive income attributable to Ferro Corporation                     | \$ 24,587                | \$ 55,773 | \$ 63,785 |

See accompanying notes to consolidated financial statements.

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## FERRO CORPORATION AND SUBSIDIARIES

## CONSOLIDATED BALANCE SHEETS

|  | December<br>31,<br>2015 | December<br>31,<br>2014 |
|--|-------------------------|-------------------------|
|  | (Dollars in thousands)  |                         |
| <b>ASSETS</b>  |                         |                         |
| Current assets   |                         |                         |
| Cash and cash equivalents  | \$ 58,380               | \$ 140,500              |
| Accounts receivable, net   | 231,970                 | 236,749                 |
| Inventories  | 184,854                 | 158,368                 |
| Deferred income taxes  | 12,088                  | 7,532                   |
| Other receivables  | 34,088                  | 25,635                  |
| Other current assets   | 15,695                  | 17,912                  |
| Current assets held-for-sale   | 16,215                  | 27,087                  |
| Total current assets   | 553,290                 | 613,783                 |
| Other assets   |                         |                         |
| Property, plant and equipment, net   | 260,429                 | 212,642                 |
| Goodwill   | 145,669                 | 93,733                  |
| Intangible assets, net   | 106,633                 | 57,309                  |
| Deferred income taxes  | 87,385                  | 39,712                  |
| Other non-current assets   | 48,767                  | 55,638                  |
| Non-current assets held-for-sale   | 23,178                  | 18,737                  |
| Total assets   | \$ 1,225,351            | \$ 1,091,554            |
| <b>LIABILITIES AND EQUITY</b>  |                         |                         |
| Current liabilities  |                         |                         |
| Loans payable and current portion of long-term debt  | \$ 7,446                | \$ 8,382                |
| Accounts payable   | 120,380                 | 129,236                 |
| Accrued payrolls   | 28,584                  | 36,051                  |
| Accrued expenses and other current liabilities   | 54,664                  | 53,133                  |
| Current liabilities held-for-sale  | 7,156                   | 10,016                  |
| Total current liabilities  | 218,230                 | 236,818                 |
| Other liabilities  |                         |                         |
| Long-term debt, less current portion   | 466,108                 | 298,285                 |
| Postretirement and pension liabilities   | 148,249                 | 167,772                 |
| Other non-current liabilities  | 66,990                  | 50,359                  |
| Non-current liabilities held-for-sale  | 1,493                   | 2,304                   |
| Total liabilities  | 901,070                 | 755,538                 |
| Equity   |                         |                         |
| Ferro Corporation shareholders' equity:  |                         |                         |
| Common stock, par value \$1 per share; 300.0 million shares authorized; 93.4 million shares issued; 84.0 million and 87.0 million shares outstanding at December 31, 2015, and December 31, 2014, respectively | 93,436                  | 93,436                  |

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|  |              |              |
|--|--------------|--------------|
| Paid-in capital                              | 314,854      | 317,404      |
| Retained earnings                            | 135,507      | 71,407       |
| Accumulated other comprehensive loss         | (61,318)     | (21,805)     |
| Common shares in treasury, at cost           | (166,020)    | (136,058)    |
| Total Ferro Corporation shareholders' equity | 316,459      | 324,384      |
| Noncontrolling interests                     | 7,822        | 11,632       |
| Total equity                                 | 324,281      | 336,016      |
| Total liabilities and equity                 | \$ 1,225,351 | \$ 1,091,554 |

See accompanying notes to consolidated financial statements.

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## FERRO CORPORATION AND SUBSIDIARIES

## CONSOLIDATED STATEMENTS OF EQUITY

|   | Ferro Corporation Shareholders |              |                 |                    |                                   |  |                                  |                 |
|---|--------------------------------|--------------|-----------------|--------------------|-----------------------------------|--|----------------------------------|-----------------|
|   | Common Shares<br>in Treasury   |              | Common<br>Stock | Paid-in<br>Capital | Retained<br>(Deficit)<br>Earnings | Accumulated<br>Other<br>Comprehensive<br>Income<br>(Loss)(a) | Non-<br>controlling<br>Interests | Total<br>Equity |
|   | Shares                         | Amount       |                 |                    |                                   |  |                                  |                 |
|   | (In thousands)                 |              |                 |                    |                                   |  |                                  |                 |
| Balances at<br>December 31,<br>2012             | 6,962                          | \$ (151,605) | \$ 93,436       | \$ 321,652         | \$ (86,606)                       | \$ 16,650  | \$ 13,147                        | \$ 206,674      |
| Net income                                      | —                              | —            | —               | —                  | 71,942                            | —  | 503                              | 72,445          |
| Other<br>comprehensive<br>(loss) income         | —                              | —            | —               | —                  | —                                 | (8,157)  | 229                              | (7,928)         |
| Stock-based<br>compensation<br>transactions     | (232)                          | 7,803        | —               | (3,597)            | —                                 | —  | —                                | 4,206           |
| Distributions to<br>noncontrolling<br>interests | —                              | —            | —               | —                  | —                                 | —  | (1,554)                          | (1,554)         |
| Balances at<br>December 31,<br>2013             | 6,730                          | (143,802)    | 93,436          | 318,055            | (14,664)                          | 8,493  | 12,325                           | 273,843         |
| Net income                                      | —                              | —            | —               | —                  | 86,071                            | —  | 160                              | 86,231          |
| Other<br>comprehensive<br>loss                  | —                              | —            | —               | —                  | —                                 | (30,298)   | (171)                            | (30,469)        |
| Stock-based<br>compensation<br>transactions     | (285)                          | 7,744        | —               | (651)              | —                                 | —  | —                                | 7,093           |
| Distributions to<br>noncontrolling<br>interests | —                              | —            | —               | —                  | —                                 | —  | (682)                            | (682)           |
| Balances at<br>December 31,<br>2014             | 6,445                          | (136,058)    | 93,436          | 317,404            | 71,407                            | (21,805)   | 11,632                           | 336,016         |
| Net income (loss)                               | —                              | —            | —               | —                  | 64,100                            | —  | (996)                            | 63,104          |
| Other<br>comprehensive                          | —                              | —            | —               | —                  | —                                 | (39,513)   | (1,365)                          | (40,878)        |



|   |       |              |           |            |            |             |          |            |
|---|-------|--------------|-----------|------------|------------|-------------|----------|------------|
| loss                                      |       |              |           |            |            |             |          |            |
| Purchase of treasury stock                | 3,283 | (38,571)     | —         | —          | —          | —           | —        | (38,571)   |
| Stock-based compensation transactions     | (297) | 8,609        | —         | (2,550)    | —          | —           | —        | 6,059      |
| Sale of noncontrolling interest           | —     | —            | —         | —          | —          | —           | (581)    | (581)      |
| Distributions to noncontrolling interests | —     | —            | —         | —          | —          | —           | (868)    | (868)      |
| Balances at December 31, 2015             | 9,431 | \$ (166,020) | \$ 93,436 | \$ 314,854 | \$ 135,507 | \$ (61,318) | \$ 7,822 | \$ 324,281 |

(a) Accumulated translation adjustments were (\$62.1) million, (\$22.6) million, and \$6.6 million and accumulated postretirement benefit liability adjustments were \$0.8 million, \$0.9 million, and \$1.9 million at December 31, 2015, 2014, and 2013, respectively, all net of tax.

See accompanying notes to consolidated financial statements.

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## FERRO CORPORATION AND SUBSIDIARIES

## CONSOLIDATED STATEMENTS OF CASH FLOWS

|  | 2015                   | 2014      | 2013      |
|--|------------------------|-----------|-----------|
|  | (Dollars in thousands) |           |           |
| Cash flows from operating activities   |                        |           |           |
| Net income   | \$ 63,104              | \$ 86,231 | \$ 72,445 |
| Adjustments to reconcile net income to net cash provided by operating activities:  |                        |           |           |
| Loss (gain) on sale of assets and businesses                                       | 1,836                  | (124,026) | (15,604)  |
| Depreciation and amortization  | 41,061                 | 35,384    | 47,123    |
| Interest amortization  | 1,125                  | 3,106     | 2,905     |
| Restructuring and impairment charges   | 13,270                 | 11,564    | 20,581    |
| Loss on extinguishment of debt   | —                      | 14,384    | —         |
| Devaluation of Venezuela   | 3,343                  | 1,094     | —         |
| Provision for allowance for doubtful accounts                                      | 639                    | 2,731     | 4,074     |
| Retirement benefits  | (5,986)                | 55,755    | (97,053)  |
| Deferred income taxes  | (66,328)               | (21,310)  | 7,853     |
| Non-cash foreign currency losses (gains)   | 9,447                  | 13,254    | (13,028)  |
| Changes in current assets and liabilities, net of effects of acquisitions:         |                        |           |           |
| Accounts receivable  | 20,208                 | (5,667)   | 16,224    |
| Inventories  | 6,562                  | (12,575)  | 18,056    |
| Other receivables and other current assets   | 4,147                  | (8,570)   | (826)     |
| Accounts payable   | (14,605)               | 5,936     | (27,963)  |
| Accrued expenses and other current liabilities                                     | (23,547)               | (12,515)  | (6,939)   |
| Other operating activities   | (3,074)                | 15,697    | (9,384)   |
| Net cash provided by operating activities  | 51,202                 | 60,473    | 18,464    |
| Cash flows from investing activities   |                        |           |           |
| Capital expenditures for property, plant and equipment and other long lived assets | (43,087)               | (53,768)  | (34,220)  |
| Proceeds from sale of businesses, net  | —                      | 237,830   | 16,912    |
| Proceeds from sale of assets   | 642                    | 6,740     | 33,261    |
| Business acquisitions, net of cash acquired  | (202,155)              | (115,598) | —         |
| Other investing activities   | —                      | —         | 1,215     |
| Net cash (used in) provided by investing activities                                | (244,600)              | 75,204    | 17,168    |
| Cash flows from financing activities   |                        |           |           |
| Net repayments under loans payable (1)   | (7,261)                | (41,101)  | (5,884)   |
| Proceeds from revolving credit facility  | 242,390                | 457,907   | 449,268   |
| Principal payments on term loan facility   | (3,000)                | (750)     | —         |
| Principal payments on revolving credit facility                                    | (72,390)               | (467,112) | (442,659) |
| Proceeds from term loan facility   | —                      | 300,000   | —         |
| Extinguishment of convertible senior notes   | —                      | —         | (35,066)  |
| Repayment of 7.875% Senior Notes   | —                      | (260,451) | —         |
| Payment of debt issuance costs   | —                      | (7,071)   | —         |

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|  |           |            |           |
|--|-----------|------------|-----------|
| Proceeds from exercise of stock options                      | 404       | 684        | 666       |
| Purchase of treasury stock                                   | (38,571)  | —          | —         |
| Other financing activities                                   | (1,846)   | (249)      | (3,040)   |
| Net cash provided by (used for) financing activities         | 119,726   | (18,143)   | (36,715)  |
| Effect of exchange rate changes on cash and cash equivalents | (8,448)   | (5,362)    | (165)     |
| (Decrease) increase in cash and cash equivalents             | (82,120)  | 112,172    | (1,248)   |
| Cash and cash equivalents at beginning of period             | 140,500   | 28,328     | 29,576    |
| Cash and cash equivalents at end of period                   | \$ 58,380 | \$ 140,500 | \$ 28,328 |
| Cash paid during the period for:                             |           |            |           |
| Interest   | \$ 16,188 | \$ 28,536  | \$ 26,775 |
| Income taxes   | \$ 21,364 | \$ 9,376   | \$ 5,815  |

(1) Includes cash flows related to loans payable to banks, the payment of the assumption of debt relating to acquisitions, our domestic accounts receivable sales program, and international accounts receivable sales programs.

See accompanying notes to consolidated financial statements.

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1. Our Business

Ferro Corporation (“Ferro,” “we,” “us” or “the Company”) produces performance materials for a broad range of manufacturers in diversified industries throughout the world. Our products are classified as performance materials, rather than commodities, because they are formulated to perform specific and important functions both in the manufacturing processes and in the finished products of our customers. We use inorganic and organic chemical processes, polymer science and materials science to develop and produce these performance materials. Performance materials require a high degree of technical service on an individual customer basis. The value of our products stems from the results and performance they achieve in actual use. We manage our businesses through four business units that are differentiated from one another by product type. We have grouped these units by their product type below:

- Tile Coating Systems
- Porcelain Enamel
- Performance Colors and Glass
- Pigments, Powders and Oxides

We produce our products primarily in the Europe-Middle East region, the United States (“U.S.”), the Asia-Pacific region, and Latin America.

We sell our products directly to customers and through the use of agents or distributors throughout the world. Our products are sold principally in the Europe-Middle East region, the U.S., the Asia-Pacific region, and Latin America. Our customers manufacture products to serve a variety of end markets, including building and renovation, electronics, automobiles, appliances, household furnishings, packaging, and industrial products.

The Company owned 51% of an operating affiliate in Venezuela that was a consolidated subsidiary of Ferro. During the fourth quarter of 2015, we sold the operating affiliate in Venezuela for a cash purchase price of \$0.5 million. During 2015, the Ministry of Economy, Finance, and Public Banking, and the Central Bank of Venezuela published a new exchange rate, the Foreign Exchange Marginal System (“SIMADI”). We concluded in March 2015 that SIMADI was the most relevant exchange mechanism available, and began using SIMADI to translate the local currency financial statements. As a result of the revaluation, we recognized a \$1.9 million foreign currency loss and a \$2.6 million loss due to lower of cost or market charges against our inventory, prior to the adjustment for losses allocated to our noncontrolling interest partner, which is recorded within Foreign currency losses, net and Cost of sales, respectively, in our consolidated statement of operations for the year ended December 31, 2015.

In the first quarter of 2014, the Venezuelan government expanded and introduced alternative market mechanisms for monetary exchange between the local currency, the Bolivar, and the United States Dollar. As a result of changes in the political and economic environment in the country, we began to remeasure the monetary assets and liabilities of the entity utilizing the most relevant exchange mechanism available, which we concluded to be SICAD I in the first quarter of 2014. The impact of the remeasurement in 2014, prior to adjustment for losses allocated to our noncontrolling interest partner, was a loss of \$1.6 million, which is recorded within Foreign currency losses, net in our consolidated statement of operations for the year ended December 31, 2014.

During the second quarter of 2014, substantially all of the assets and liabilities of our Specialty Plastics and Polymer Additives reportable segments were classified as held-for-sale in the accompanying consolidated balance sheets. As further discussed in Note 3, the Specialty Plastics sale closed on July 1, 2014, and the North America-based Polymer Additives sale closed on December 19, 2014. Therefore, the Specialty Plastics and North America-based Polymer Additives operating results, net of income tax, have been classified as discontinued operations in the accompanying consolidated statements of operations for all relevant periods presented. We have classified the Europe-based Polymer Additives assets and liabilities as held-for-sale in the accompanying consolidated balance sheets and have classified the related operating results, net of income tax, as discontinued operations in the accompanying consolidated statements of operations for all periods presented.

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### 2. Significant Accounting Policies

#### Principles of Consolidation

Our consolidated financial statements include the accounts of the parent company and the accounts of its subsidiaries. When we consolidate our financial statements, we eliminate intercompany transactions, accounts and profits. When we exert significant influence over an investee but do not control it, we account for the investment and the investment income using the equity method. These investments are reported in the Other non-current assets section of our balance sheet. We consolidate four legal entities in which we do not own 100% of the equity interests, either directly or indirectly through our subsidiaries. These entities have non-controlling interest ownerships ranging from 5% to 41%.

When we acquire a subsidiary, its financial results are included in our consolidated financial statements from the date of the acquisition. When we dispose of a subsidiary, its financial results are included in our consolidated financial statements until the date of the disposition. In the event that a disposal group meets the criteria for discontinued operations, prior periods are adjusted to reflect the classification.

#### Use of Estimates and Assumptions in the Preparation of Financial Statements

We prepare our consolidated financial statements in conformity with accounting principles generally accepted in the United States, which requires us to make estimates and to use judgments and assumptions that affect the timing and amount of assets, liabilities, equity, revenues and expenses recorded and disclosed. The more significant estimates and judgments relate to revenue recognition, restructuring and cost reduction programs, goodwill, asset impairment, income taxes, pension and other postretirement benefits, inventories, and environmental liabilities. Actual outcomes could differ from our estimates, resulting in changes in revenues or costs that could have a material impact on the Company's results of operations, financial position, or cash flows.

#### Foreign Currency Translation

The financial results of our operations outside of the U.S. are recorded in local currencies, which generally are also the functional currencies for financial reporting purposes. The results of operations outside of the U.S. are translated from these functional currencies into U.S. dollars using the average monthly currency exchange rates. We use the average currency exchange rate for these results of operations as a reasonable approximation of the results had specific currency exchange rates been used for each individual transaction. Foreign currency transaction gains and losses are recorded as incurred as Other expense (income) in the consolidated statements of operations. Assets and liabilities are translated into U.S. dollars using exchange rates at the balance sheet dates, and we record the resulting foreign currency translation adjustment as a separate component of Accumulated other comprehensive loss in equity.

#### Revenue Recognition

We typically recognize sales when we ship goods to our customers and when all of the following criteria are met:

- Persuasive evidence of an arrangement exists;
- The selling price is fixed or determinable;
- Collection is reasonably assured; and
- Title and risk of loss has passed to our customers.

In order to ensure the revenue recognition in the proper period, we review material sales contracts for proper cut-off based upon the business practices and legal requirements of each country. For sales of all products, including those

containing precious metals, we report revenues gross along with their corresponding cost of sales to arrive at gross profit. We record revenues this way because we act as the principal in the transactions into which we enter.

The amount of shipping and handling fees invoiced to our customers at the time our product is shipped is included in net sales. Credit memos issued to customers for sales returns, discounts allowed and sales adjustments are recorded when they are incurred as a reduction of sales.

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Additionally, we provide certain of our customers with incentive rebate programs to promote customer loyalty and encourage greater product sales. We accrue customer rebates over the rebate periods based upon estimated attainments of the provisions in the rebate agreements and record these rebate accruals as reductions of sales.

### Research and Development Expenses

Research and development expenses are expensed as incurred and are included in Selling, general and administrative expenses. Total expenditures for product and application technology, including research and development, customer technical support and other related activities, were approximately \$25.6 million for 2015, \$22.7 million for 2014 and \$25.9 million for 2013.

### Restructuring Programs

We expense costs associated with exit and disposal activities designed to restructure operations and reduce ongoing costs of operations when we incur the related liabilities or when other triggering events occur. After the appropriate level of management having the authority approves the detailed restructuring plan and the appropriate criteria for recognition are met, we establish accruals for employee termination costs. The accruals are estimates that are based upon factors including statutory and union requirements, affected employees' lengths of service, contract provisions, salary level, and health care benefit choices. We also analyze the carrying value of affected long-lived assets for impairment and reductions in their remaining estimated useful lives. In addition, we record the fair value of any new or remaining obligations when existing operating lease contracts are terminated or abandoned as a result of our exit and disposal activities.

### Asset Impairment

The Company's long-lived assets include property, plant and equipment, goodwill, and intangible assets. We review property, plant and equipment and intangible assets for impairment whenever events or circumstances indicate that their carrying values may not be recoverable. The following are examples of such events or changes in circumstances:

- An adverse change in the business climate or market price of a long-lived asset or asset group;
- An adverse change in the extent or manner in which a long-lived asset or asset group is used or in its physical condition;
- Current operating losses for a long-lived asset or asset group combined with a history of such losses or projected or forecasted losses that demonstrate that the losses will continue; or
- A current expectation that, more likely than not, a long-lived asset or asset group will be sold or otherwise significantly disposed of before the end of its previously estimated useful life.

The carrying amount of property, plant and equipment and intangible assets is not recoverable if the carrying value of the asset group exceeds the sum of the undiscounted cash flows expected to result from the use and eventual disposition of the asset group. In the event of impairment, we recognize a loss for the excess of the recorded value over fair value. The long-term nature of these assets requires the estimation of cash inflows and outflows several years into the future and only takes into consideration technological advances known at the time of review.

We review goodwill for impairment annually using a measurement date of October 31, primarily due to the timing of our annual budgeting process, or more frequently in the event of an impairment indicator. The fair value of each reporting unit that has goodwill is estimated using the average of both the income approach and the market approach, which we believe provides a reasonable estimate of the reporting unit's fair value, unless facts or circumstances exist which indicate a more representative fair value. The income approach is a discounted cash flow model, which uses



projected cash flows attributable to the reporting unit, including an allocation of certain corporate expenses based primarily on a proportional sales method. We use historical results, trends and our projections of market growth, internal sales efforts and anticipated cost structure assumptions to estimate future cash flows. Using a risk-adjusted, weighted-average cost of capital, we discount the cash flow projections to the measurement date. The market approach estimates a price reasonably expected to be paid by a market participant in the purchase of the reporting units based on a comparison to similar businesses. If the fair value of any reporting unit was determined to be less than its carrying value, we would obtain comparable market values or independent appraisals of its net assets.

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### Derivative Financial Instruments

As part of our risk management activities, we employ derivative financial instruments, primarily foreign currency forward contracts, to hedge certain anticipated transactions, firm commitments, or assets and liabilities denominated in foreign currencies. We also purchase portions of our energy and precious metal requirements under fixed price forward purchase contracts designated as normal purchase contracts.

We record derivatives on our balance sheet as either assets or liabilities that are measured at fair value. For derivative instruments that are designated and qualify as cash flow hedges, the gain or loss on the derivative is reported as a component of other comprehensive income and reclassified from accumulated other comprehensive income into earnings when the hedged transaction affects earnings. As of December 31, 2015, we did not have any derivative instruments classified as cash flow hedges. The ineffective portion, if any, in the change in value of these derivatives is immediately recognized in earnings. For derivatives that are not designated as hedges, the gain or loss on the derivative is recognized in current earnings. We use derivatives only to manage well-defined risks and do not use derivatives for speculative purposes.

### Postretirement and Other Employee Benefits

We recognize postretirement and other employee benefits as employees render the services necessary to earn those benefits. We determine defined benefit pension and other postretirement benefit costs and obligations with the assistance of third parties who perform certain actuarial calculations. The calculations and the resulting amounts recorded in our consolidated financial statements are affected by assumptions including the discount rate, expected long-term rate of return on plan assets, the annual rate of change in compensation for plan-eligible employees, estimated changes in costs of healthcare benefits, mortality tables, and other factors. We evaluate the assumptions used on an annual basis.

### Income Taxes

We account for income taxes in accordance with Accounting Standards Codification (“ASC”) Topic 740, Income Taxes, which requires the recognition of deferred tax assets and liabilities for the expected future tax effects of events that have been included in the financial statements. Under this method, deferred tax assets and liabilities are determined based on the differences between the financial statements and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in income in the period that includes the enactment date.

We record deferred tax assets to the extent we believe these assets will more likely than not be realized. In making such determination, we consider all available positive and negative evidence, including future reversals of existing taxable temporary differences, projected future income, tax planning strategies, and recent financial operations.

We recognize a tax benefit from an uncertain tax position when it is more likely than not that the position will be sustained upon examination, including resolutions of any related appeals or litigation processes, based on the technical merits.

We recognize interest and penalties related to uncertain tax positions within the income tax expense line in the accompanying consolidated statements of operations.

### Cash Equivalents

We consider all highly liquid instruments with original maturities of three months or less when purchased to be cash equivalents. These instruments are carried at cost, which approximates fair value.

#### Accounts Receivable and the Allowance for Doubtful Accounts

Ferro sells its products to customers in diversified industries throughout the world. No customer or related group of customers represents greater than 10% of net sales or accounts receivable. We perform ongoing credit evaluations of our customers and require collateral principally for export sales, when industry practices allow and as market conditions dictate, subject to our ability to negotiate secured terms relative to competitive offers. We regularly analyze significant customer accounts and provide for uncollectible accounts based on historical experience, customer payment history, the length of time the receivables are past due, the financial health of the

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customer, economic conditions and specific circumstances, as appropriate. Changes in these factors could result in additional allowances. Customer accounts we conclude to be uncollectible or to require excessive collection costs are written off against the allowance for doubtful accounts. Historically, write-offs of uncollectible accounts have been within our expectations. Detailed information about the allowance for doubtful accounts is provided below:

|                                 | 2015                   | 2014      | 2013      |
|---------------------------------|------------------------|-----------|-----------|
|                                 | (Dollars in thousands) |           |           |
| Allowance for doubtful accounts | \$ 7,784               | \$ 10,325 | \$ 12,093 |
| Bad debt expense                | 667                    | 2,657     | 3,961     |

We had an asset securitization program for Ferro's U.S. trade accounts receivable where we sold undivided variable percentage interests in our domestic receivables to various purchasers, and could obtain up to \$50 million in the form of cash or letters of credit. Advances received under this program were accounted for as borrowings secured by the receivables and are included in net cash provided by financing activities. The purchasers had no recourse to Ferro's other assets for failure of payment of the receivables as a result of the lack of creditworthiness, or financial inability to pay, of the related obligor. In May 2014, the program expired and amounts outstanding were repaid at that time.

In 2011, we entered into several international programs to sell with recourse trade accounts receivable to financial institutions. Advances received under these programs were accounted for as borrowings secured by the receivables and included in net cash provided by financing activities. During 2013, the international factoring programs expired and were not renewed.

#### Inventories

We value inventory at the lower of cost or market, with cost determined utilizing the first-in, first-out (FIFO) method. We periodically evaluate the net realizable value of inventories based primarily upon their age, but also upon assumptions of future usage in production, customer demand and market conditions. Inventories have been reduced to the lower of cost or market value by allowances for slow moving or obsolete goods.

We maintain raw materials on our premises that we do not own, including precious metals consigned from financial institutions and customers, and raw materials consigned from vendors. Although we have physical possession of the goods, their value is not reflected on our balance sheet because we do not have title.

We obtain precious metals under consignment agreements with financial institutions for periods of one year or less. These precious metals are primarily silver, gold, platinum, and palladium and are used in the production of certain products for our customers. Under these arrangements, the financial institutions own the precious metals, and accordingly, we do not report these precious metals as inventory on our consolidated balance sheets although they physically are in our possession. These agreements are cancelable by either party at the end of each consignment period, however, because we have access to a number of consignment arrangements with available capacity, our consignment needs can be shifted among the other participating institutions in order to ensure our supply. In certain

cases, these financial institutions require cash deposits to provide additional collateral beyond the value of the underlying precious metals. The financial institutions charge us fees for these consignment arrangements, and these fees are recorded as cost of sales.

#### Property, Plant and Equipment

We record property, plant and equipment at historical cost. In addition to the original purchased cost, including transportation, installation and taxes, we capitalize expenditures that increase the utility or useful life of existing assets. For constructed assets, we capitalize interest costs incurred during the period of construction. We expense repair and maintenance costs, including the costs of major planned overhauls of equipment, as incurred. We depreciate property, plant and equipment on a straight-line basis, generally over the following estimated useful lives of the assets:

|                         |                |
|-------------------------|----------------|
| Buildings               | 20 to 40 years |
| Machinery and equipment | 5 to 15 years  |

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### Other Capitalized Costs

We capitalize the costs of computer software developed or obtained for internal use after the preliminary project stage has been completed, and management, with the relevant authority, authorizes and commits to funding a computer software project, and it is probable that the project will be completed and the software will be used to perform the function intended. External direct costs of materials and services consumed in developing or obtaining internal-use computer software, payroll and payroll-related costs for employees who are directly associated with the project, and interest costs incurred when developing computer software for internal use are capitalized within Intangible assets. Capitalization ceases when the project is substantially complete, generally after all substantial testing is completed. We expense training costs and data conversion costs as incurred. We amortize software on a straight-line basis over its estimated useful life, which has historically been in a range of 1 to 10 years.

### Environmental Liabilities

As part of the production of some of our products, we handle, process, use and store hazardous materials. As part of these routine processes, we expense recurring costs associated with control and disposal of hazardous materials as they are incurred. Occasionally we are subject to ongoing, pending or threatened litigation related to the handling of these materials or other matters. If, based on available information, we believe that we have incurred a liability and we can reasonably estimate the amount, we accrue for environmental remediation and other contingent liabilities. We disclose material contingencies if the likelihood of the potential loss is reasonably possible but the amount is not reasonably estimable.

In estimating the amount to be accrued for environmental remediation, we use assumptions about:

- Remediation requirements at the contaminated site;
- The nature of the remedy;
- Existing technology;
- The outcome of discussions with regulatory agencies;
- Other potentially responsible parties at multi-party sites; and
- The number and financial viability of other potentially responsible parties.

We actively monitor the status of sites, and, as assessments and cleanups proceed, we update our assumptions and adjust our estimates as necessary. Because the timing of related payments is uncertain, we do not discount the estimated remediation costs.

### Recently Adopted Accounting Pronouncement

In April 2015, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”) 2015-03, Interest – Imputation of Interest: Subtopic 835-30: Simplifying the Presentation of Debt Issuance Costs. ASU 2015-03 requires debt issuance costs to be presented in the balance sheets as a reduction of the related debt liability rather than an asset. The update requires retrospective application. The Company early-adopted ASU 2015-03 as of the end of its fiscal year 2015, and applied its provisions retrospectively. The adoption resulted in the reclassification of \$5.3 million of unamortized debt issuance costs related to the term loan facility from Other non-current assets to a reduction in Long-term debt, less current portion in our consolidated balance sheets as of December 31, 2014. Adoption of this pronouncement resulted in similar classification of \$4.6 million of unamortized debt issuance costs as of December 31, 2015. Other than this reclassification, the adoption of ASU-2015-03 did not have an impact of the

Company's consolidated financial statements.

In September 2015, the FASB issued ASU 2015-16, Business Combination: Topic 805: Simplifying the Accounting for Measurement-Period Adjustments. ASU 2015-16 requires an acquirer recognize adjustments to estimated amounts that are identified during the measurement period in the reporting period in which the adjustments are determined and also record the effect on earnings. The Company early-adopted ASU 2015-16 as of the end of its fiscal year 2015. The adoption of this pronouncement did not have a material effect on our consolidated financial statements.

On January 1, 2015, we adopted FASB ASU 2014-08, Reporting Discontinued Operations and Disclosures of Disposals of Components of an Entity, which is codified in ASC Topic 205, Presentation of Financial Statements, and ASC Topic 360, Property, Plant, and Equipment. This pronouncement changes the definition of a discontinued operation to include only those disposals of components

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of an entity that represent a strategic shift that has (or will have) a major effect on an entity's operations and financial results, and changes the criteria and enhances disclosures for reporting discontinued operations. The adoption of this pronouncement did not have a material effect on our consolidated financial statements.

On January 1, 2015, we adopted FASB ASU 2014-12, Compensation-Stock Compensation (Topic 718): Accounting for Share-Based Payments When the Terms of an Award Provide That a Performance Target Could Be Achieved after the Requisite Service Period. ASU 2014-12 requires a reporting entity to treat a performance target that affects vesting and that could be achieved after the requisite service period as a performance condition. The adoption of this pronouncement did not have a material effect on our consolidated financial statements.

On January 1, 2015, we adopted FASB ASU 2014-18, Accounting for Identifiable Intangible Assets in a Business Combination. ASU 2014-18 is an accounting alternative which applies when an entity is required to recognize or otherwise consider the fair value of intangible assets as a result of specific transaction. The adoption of this pronouncement did not have a material effect on our consolidated financial statements.

### New Accounting Standards

In May 2014, the FASB issued ASU 2014-09, Revenue from Contracts with Customers: Topic 606. This ASU replaces nearly all existing U.S. GAAP guidance on revenue recognition. The standard prescribes a five-step model for recognizing revenue, the application of which will require significant judgment. This standard is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2017. The Company is in the process of assessing the impact the adoption of this ASU will have on our consolidated financial statements.

In January 2015, the FASB issued ASU 2015-01, Simplifying Income Statement Presentation by Eliminating the Concept of Extraordinary Items: Subtopic 225-20. ASU 2015-01 eliminates the concept of extraordinary items. This standard is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2015. Early adoption is permitted. ASU 2015-01 may be applied prospectively or retrospectively to all prior periods presented in the financial statements. We do not expect the adoption of this pronouncement will have a material effect on our consolidated financial statements.

In February 2015, the FASB issued ASU 2015-02, Amendments to the Consolidation Analysis: Topic 810. This pronouncement makes amendments to the current consolidation guidance. ASU 2015-02 is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2015. Early adoption is permitted. ASU 2015-02 may be applied using a modified retrospective approach by recording a cumulative-effect adjustment to equity as of the beginning of the fiscal year of adoption or may be applied retrospectively. We do not expect the adoption of this pronouncement will have a material effect on our consolidated financial statements.

In July 2015, the FASB issued ASU 2015-11, Inventory: Topic 330: Simplifying the Measurement of Inventory. ASU 2015-11 requires an entity to measure in scope inventory at the lower of cost and net realizable value. This pronouncement is effective for financial statements issued for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2016. Early adoption is permitted. ASU 2015-11 should be applied on a



prospective basis. The Company is in the process of assessing the impact the adoption of this ASU will have on our consolidated financial statements.

In November 2015, the FASB issued ASU 2015-17, Income Taxes: Topic 740: Balance Sheet Classification of Deferred Taxes. ASU 2015-17 requires deferred tax assets and liabilities to be classified as noncurrent in a classified statement of financial position. This pronouncement is effective for financial statements issued for annual periods beginning after December 15, 2016, and interim periods within those annual periods. Early adoption is permitted. ASU 2015-17 may be applied either on a retrospective or prospective basis. The Company is in the process of assessing the impact the adoption of this ASU will have on our consolidated financial statements.

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## 3. Discontinued Operations

## Specialty Plastics

During 2014, we sold substantially all of the assets related to our Specialty Plastics business to A. Schulman, Inc. and its wholly owned subsidiary, A. Schulman Castellon, S.L.U. (collectively "Schulman") for a cash purchase price of \$91.0 million. The transaction resulted in net proceeds of \$88.3 million after expenses, and a gain of approximately \$54.9 million. Assets included in the transaction were Ferro's plastics manufacturing sites in Stryker, Ohio; Evansville and Plymouth, Indiana; Carpentersville, Illinois; and Castellon, Spain. We have classified the Specialty Plastics operating results and gain on sale, net of income tax, as discontinued operations in the accompanying consolidated statements of operations for all relevant periods presented.

## Polymer Additives

During 2014, we commenced a process to market for sale all of the assets of our Polymer Additives business. We determined that the criteria to classify these assets as held-for-sale under ASC Topic 360, Property, Plant and Equipment, were met. For purposes of applying the guidance within ASC 360, the assets have been categorized into two disposal groups: (1) our Europe-based Polymer Additives assets, including the Antwerp, Belgium dibenzoates manufacturing assets, and related Polymer Additives European headquarters and lab facilities and (2) the remainder of the Polymer Additives assets, our North America-based Polymer Additives business. During 2014, we sold substantially all of the assets related to our North America-based Polymer Additives business for a cash purchase price of \$153.5 million. The transaction resulted in net proceeds of \$149.5 million after expenses, and a gain of approximately \$72.7 million. We have classified the operating results and gain on sale, net of income tax, as discontinued operations in the accompanying consolidated statements of operations for all relevant periods presented.

As the Europe-based Polymer Additives assets have met the criteria to be recorded as held-for-sale, they are required to be recorded at the lesser of carrying value, or fair value less costs to sell. As discussed in Note 6 - Property, Plant and Equipment, the Europe-based Polymer Additives assets had a carrying value that exceeded fair value, resulting in an impairment charge of \$11.8 million and \$21.6 million that has been recorded in (Loss) income from discontinued operations, net of income tax, for the years ended December 31, 2015 and December 31, 2014, respectively. We have classified the Europe-based Polymer Additives assets and liabilities as held-for-sale in the accompanying consolidated balance sheets and have classified the related operating results, net of income tax, as discontinued operations in the accompanying consolidated statements of operations for all periods presented.

## Ferro Pfanstiehl Laboratories, Inc.

During 2013, we completed the sale of the stock of our pharmaceuticals business, Ferro Pfanstiehl Laboratories, Inc. ("FPL"), which was previously reported within the Pharmaceuticals reportable segment. Consideration was comprised of a \$16.9 million cash payment, and the transaction also included an earn-out incentive of up to \$8.0 million based on achieving certain earnings targets over a two-year period. In March 2013, prior to the sale, an impairment loss of \$8.7 million associated with the long lived assets of FPL was recorded under ASC Topic 360, Property, Plant and Equipment. The write-down was determined by estimating the fair value of the assets less cost to sell of \$14.8 million using the market approach considering a bona fide purchase offer, a Level 3 measurement within

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the fair value hierarchy. We have classified FPL's operating results, net of income tax, as discontinued operations in the accompanying consolidated statements of operations for all relevant periods presented.

The table below summarizes results for Polymer Additives, Specialty Plastics and FPL, for the years ended December 31, 2015, 2014 and 2013, which are reflected in our consolidated statements of operations as discontinued operations. Interest expense has been allocated to the discontinued operations based on the ratio of net assets of each business to consolidated net assets excluding debt.

|   | 2015                   | 2014       | 2013       |
|---|------------------------|------------|------------|
|   | (Dollars in thousands) |            |            |
| Net sales   | \$ 33,825              | \$ 343,348 | \$ 451,615 |
| Cost of sales   | 53,213                 | 295,697    | 397,534    |
| Gross profit  | (19,388)               | 47,651     | 54,081     |
| Selling, general and administrative expenses                    | 4,189                  | 17,737     | 26,710     |
| Restructuring and impairment charges                            | 11,792                 | 21,769     | 9,486      |
| Interest expense  | 763                    | 3,846      | 7,770      |
| Gain on sale of business, net                                   | —                      | (127,579)  | —          |
| Miscellaneous expense, net                                      | 647                    | 1,090      | 993        |
| (Loss) income from discontinued operations before income taxes  | (36,779)               | 130,788    | 9,122      |
| Income tax expense  | —                      | 35,948     | 582        |
| (Loss) income from discontinued operations, net of income taxes | \$ (36,779)            | \$ 94,840  | \$ 8,540   |

The following table summarizes the assets and liabilities which are classified as held-for-sale at December 31, 2015, and December 31, 2014:

|                                    | December<br>31, 2015      | December<br>31, 2014 |
|------------------------------------|---------------------------|----------------------|
|                                    | (Dollars in<br>thousands) |                      |
| Accounts receivable, net           | \$ 4,028                  | \$ 5,959             |
| Inventories                        | 9,733                     | 19,217               |
| Other current assets               | 2,454                     | 1,911                |
| Current assets held-for-sale       | 16,215                    | 27,087               |
| Property, plant and equipment, net | 22,973                    | 18,174               |

|  |           |           |
|--|-----------|-----------|
| Other non-current assets                       | 205       | 563       |
| Non-current assets held-for-sale               | 23,178    | 18,737    |
| Total assets held-for-sale                     | \$ 39,393 | \$ 45,824 |
| Accounts payable                               | \$ 5,736  | \$ 8,181  |
| Accrued expenses and other current liabilities | 1,420     | 1,835     |
| Current liabilities held-for-sale              | 7,156     | 10,016    |
| Other non-current liabilities                  | 1,493     | 2,304     |
| Total liabilities held-for-sale                | \$ 8,649  | \$ 12,320 |

#### 4. Acquisitions

##### Al Salomi

On November 17, 2015, the Company acquired 100% of the equity of Egypt-based tile coatings manufacturer Al Salomi for Frits and Glazes (“Al Salomi”) for EGP 307 million (approximately \$38.2 million), including the assumption of debt. The acquired business contributed net sales of \$2.3 million and net loss attributable to Ferro Corporation of \$0.5 million for the period from November 17, 2015 to December 31, 2015. The Company incurred acquisition related costs of \$0.6 million for the year ended December 31, 2015, which is recorded within Selling, general and administrative expenses, in our consolidated statements of operations.

The information included herein has been prepared based on the preliminary allocation of the purchase price using estimates of the fair value and useful lives of the assets acquired and liabilities assumed, which were determined with the assistance of third parties

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who performed independent valuations using discounted cash flow and comparative market approaches and estimates made by management. As of December 31, 2015, the purchase price allocation is subject to further adjustment until all information is fully evaluated by the Company. The Company recorded \$15.0 million of amortizable intangible assets, \$14.3 million of goodwill, \$10.7 million of personal and real property, \$4.8 million of a deferred tax liability related to the amortizable intangible assets, and \$3.0 million of net working capital on the consolidated balance sheet.

## Nubiola

On July 7, 2015, the Company acquired the entire share capital of Corporación Química Vhem, S.L., Dibon USA, LLC and Ivory Corporation, S.A. (together with their direct and indirect subsidiaries, “Nubiola”) on a cash-free and debt-free basis for €167 million (approximately \$184.2 million). The acquisition was funded with excess cash and borrowings under the Company’s existing revolving credit facility. See Note 8 for additional detail on the revolving credit facility. Nubiola is a worldwide producer of specialty inorganic pigments and the world’s largest producer of Ultramarine Blue. Nubiola also produces specialty Iron Oxides, Chrome Oxide Greens and Corrosion Inhibitors. Nubiola has production facilities in Spain, Colombia, Romania, and India and a joint venture in China.

The information included herein has been prepared based on the preliminary allocation of the purchase price using estimates of the fair value and useful lives of the assets acquired and liabilities assumed, which were determined with the assistance of third parties who performed independent valuations using discounted cash flow and comparative market approaches and estimates made by management. As of December 31, 2015, the purchase price allocation is subject to further adjustment until all information is fully evaluated by the Company.

The following table summarizes the preliminary purchase price allocations:

|                              | July 7,<br>2015<br>(Dollars in<br>thousands) |
|------------------------------|--|
| Net working capital (1)      | \$ 46,642                                    |
| Cash and equivalents         | 19,966                                       |
| Personal property            | 39,444                                       |
| Real property                | 28,510                                       |
| Intangible assets            | 33,152                                       |
| Other assets and liabilities | (22,660)                                     |
| Goodwill                     | 39,151                                       |
| Net assets acquired          | \$ 184,205                                   |

(1) Net working capital is defined as current assets, less cash, less current liabilities, and includes an estimate of potential transactional adjustments.

The acquired business contributed net sales of \$56.9 million and net income attributable to Ferro Corporation of \$0.3 million for the period from July 7, 2015, to December 31, 2015. The Company incurred acquisition related costs of \$5.4 million for the year ended December 31, 2015, which is recorded within Selling, general and administrative expenses, in our consolidated statements of operations.

The estimated fair value of the receivables acquired is \$24.5 million, with a gross contractual amount of \$25.2 million. The Company preliminarily recorded acquired intangible assets subject to amortization of \$27.0 million, which is comprised of \$10.3 million of customer relationships and \$16.7 million of technology/know-how, which will be amortized over 20 years and 15 years, respectively. The Company preliminarily recorded acquired indefinite-lived intangible assets of \$6.2 million related to trade names and trademarks. Goodwill is calculated as the excess of the purchase price over the estimated fair values of the assets acquired and the liabilities assumed in the acquisition and is a result of anticipated synergies. Goodwill is not expected to be deductible for tax purposes.

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The following unaudited pro forma information represents the consolidated results of the Company as if the Nubiola acquisition occurred as of January 1, 2014:

|  | 2015<br>(unaudited)                      | 2014         |
|--|--|--------------|
|  | (In thousands, except per share amounts) |              |
| Net sales  | \$ 1,141,200                             | \$ 1,251,266 |
| Net income attributable to Ferro Corporation common shareholders                       | \$ 69,384                                | \$ 99,729    |
| Net earnings per share attributable to Ferro Corporation common shareholders - Basic   | \$ 0.80                                  | \$ 1.15      |
| Net earnings per share attributable to Ferro Corporation common shareholders - Diluted | \$ 0.78                                  | \$ 1.15      |

The unaudited pro forma information has been adjusted with the respect to certain aspects of the acquisition to reflect the following:

- Additional depreciation and amortization expenses that would have been recognized assuming fair value adjustments to the existing Nubiola assets acquired, including intangible assets and fixed assets.
- Elimination of revenue and costs of goods sold for sales from Nubiola to the Company, which would be eliminated as intercompany transactions for Nubiola and the Company on a consolidated basis.
- Increased interest expense due to additional borrowings to fund the acquisition.
- Acquisition-related costs, which were included in the Company's results.
- Adjustments for the income tax effect of the pro forma adjustments related to the acquisition.

Thermark

In February 2015, the Company acquired TherMark Holdings, Inc., a leader in laser marking technology, for a cash purchase price of \$5.5 million. The Company recorded \$4.6 million of amortizable intangible assets, \$2.5 million of goodwill, \$1.7 million of a deferred tax liability related to the amortizable intangible assets, and \$0.1 million of net working capital on our consolidated balance sheet.

Vetriceramici

In 2014, Ferro Coatings Italy S.R.L., a 100% owned subsidiary of Ferro, acquired 100% of the outstanding common shares and voting interest of Vetriceramici S.p.A. ("Vetriceramici") for a purchase price of €87.2 million in cash, or \$108.9 million, based on the exchange rate on the closing date of December 1, 2014. Vetriceramici is an Italian manufacturing, marketing and distribution group that offers a range of products to its customers for the production of ceramic tiles, with some diversification in the glass sector. Vetriceramici has manufacturing facilities in Italy and Mexico, a mixing plant in Poland and research and development and sales offices in Italy and Turkey. We expect to

achieve synergies and cost reductions by eliminating redundant processes and facilities.

The acquired business contributed net sales of \$60.1 million and \$4.1 million and net income attributable to Ferro of \$11.0 million and net loss attributable to Ferro \$0.6 million for the year ended December 31, 2015 and from the date of the acquisition through December 31, 2014, respectively. The Company incurred acquisition costs during the year ended December 31, 2015 and December 31, 2014, of \$1.4 million and \$1.7 million, respectively, which are included in Selling, general and administrative expenses in our consolidated statements of operations.

The information included herein has been prepared based on the allocation of the purchase price using the fair value and useful lives of the assets acquired and liabilities assumed, which were determined with the assistance of third parties who performed independent valuations using discounted cash flow and comparative market approaches and estimates made by management.



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The following table summarizes the preliminary purchase price allocations:

|                              | December<br>1, 2014<br>(Dollars in<br>thousands) |
|------------------------------|--|
| Net working capital (1)      | \$ 27,055  |
| Real property                | 8,291  |
| Personal property            | 12,204   |
| Other assets and liabilities | (13,169)   |
| Intangible assets            | 42,060   |
| Goodwill                     | 32,431   |
| Net assets acquired          | \$ 108,872                                       |

(1) Net working capital is defined as current assets less current liabilities, and includes an estimate of potential transactional adjustments.

The fair value of the receivables acquired is \$26.0 million, with a gross contractual amount of \$27.0 million. The Company recorded acquired intangible assets subject to amortization of \$37.9 million, which is comprised of \$27.8 million of customer relationships and \$10.1 million of technology/know-how, which are amortized over 20 and 10 years, respectively. The Company recorded acquired indefinite-lived intangible assets of \$4.2 million related to trade names and trademarks. Goodwill is calculated as the excess of the purchase price over the fair values of the assets acquired and the liabilities assumed in the acquisition and is a result of anticipated synergies. Goodwill has been allocated to the Performance Coatings and Performance Colors and Glass segments of \$31.4 million and \$1.0 million, respectively. The amount of goodwill that is expected to be deductible for tax purposes is \$12.4 million.

#### Other

In July 2014, the Company acquired certain commercial assets of a reseller of our porcelain enamel products in Turkey for a cash purchase price of \$6.7 million, which is recorded in Intangible assets, net on the consolidated balance sheets.

#### 5. Inventories

Inventory at December 31 consisted of the following:

| 2015 | 2014 |
|------|------|
|------|------|

|                   | (Dollars in thousands) |            |
|-------------------|------------------------|------------|
| Raw materials     | \$ 56,291              | \$ 46,605  |
| Work in process   | 33,099                 | 32,356     |
| Finished goods    | 95,464                 | 79,407     |
| Total inventories | \$ 184,854             | \$ 158,368 |

In the production of some of our products, we use precious metals, some of which we obtain from financial institutions under consignment agreements with terms of one year or less. The financial institutions retain ownership of the precious metals and charge us fees based on the amounts we consign. These fees were \$0.8 million for 2015, \$0.8 million for 2014, and \$3.0 million for 2013. We had on hand precious metals owned by participants in our precious metals consignment program of \$20.5 million at December 31, 2015, and \$26.6 million at December 31, 2014, measured at fair value based on market prices for identical assets.

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## 6. Property, Plant and Equipment

Property, Plant and Equipment at December 31 consisted of the following:

|                                     | 2015                   | 2014       |
|-------------------------------------|------------------------|------------|
|                                     | (Dollars in thousands) |            |
| Land                                | \$ 31,009              | \$ 10,086  |
| Buildings                           | 167,653                | 163,581    |
| Machinery and equipment             | 468,485                | 472,285    |
| Construction in progress            | 14,544                 | 9,112      |
| Total property, plant and equipment | 681,691                | 655,064    |
| Total accumulated depreciation      | (421,262)              | (442,422)  |
| Property, plant and equipment, net  | \$ 260,429             | \$ 212,642 |

Depreciation expense was \$36.2 million for 2015, \$31.3 million for 2014, and \$32.4 million for 2013. Noncash investing activities for capital expenditures, consisting of new capital leases during the year and unpaid capital expenditure liabilities at year end, were \$6.6 million for 2015, \$7.9 million for 2014, and \$8.8 million for 2013.

As discussed in Note 3 - Discontinued Operations, during 2014, our Europe-based Polymer Additives assets were classified as held-for-sale under ASC Topic 360, Property, Plant and Equipment. As such, these assets were tested for impairment comparing the fair value of the assets less costs to sell, to the carrying value. The fair value was determined using both the market approach and income approach, utilizing Level 3 measurements within the fair value hierarchy, which indicated the fair value less costs to sell was less than the carrying value. As a result of the analysis, the assets had a carrying value that exceeded fair value, resulting in impairment charges totaling \$11.8 million and \$21.6 million that are included in (Loss) income from discontinued operations, net of income taxes, in our consolidated statements of operations for the years ended December 31, 2015 and December 31, 2014, respectively.

During 2014, we sold non-operating real estate assets located in South Plainfield, New Jersey and in Criciuma, Brazil, which resulted in gains of \$1.2 million and \$0.4 million, respectively. The gains on sale were offset by losses associated with the loss on sale of our corporate related real estate and the write-off of tenant improvements of \$3.5 million and \$1.3 million, respectively. The net loss of \$3.3 million related to these transactions is recorded in Miscellaneous expense (income), net in our consolidated statements of operations for the year ended December 31, 2014.

During the fourth quarter of 2013, we tested certain property, plant and equipment held for use for impairment under ASC Topic 360, Property, Plant and Equipment. Triggered by a change in expected use of a Performance Coatings operating facility in Suzhou, China in the fourth quarter of 2013, we performed the two step impairment analysis as prescribed by ASC Topic 360. As that analysis indicated that the carrying value of those assets was no longer recoverable, we estimated the fair value of the assets within the asset group using adjusted market prices for similar assets, a Level 3 measurement in the fair value hierarchy. As a result of the analysis, assets held for use with a carrying value of \$20.5 million were written down to \$13.0 million. The impairment charge of \$7.5 million is included in Restructuring and impairment charges in our statement of consolidated operations for the year ended

December 31, 2013.

During the first quarter of 2013, we sold assets related to our solar pastes product line. The consideration received for the assets sold was \$10.9 million, and resulted in a gain on the transaction of \$9.0 million which is included within Miscellaneous expense (income), net in our consolidated statement of operations for the year ended December 31, 2013.

In the first quarter of 2013, prior to the sale of Ferro Pfanstiehl Laboratories, Inc, we recorded an impairment loss of \$8.7 million, which is recorded in (Loss) income from discontinued operations, net of income taxes in our consolidated statement of operations for the year ended December 31, 2013. Refer to Note 3 for additional details regarding the sale.

| Description       | Fair Value Measurements Using |         |           |           | Total<br>(Losses) |
|-------------------|-------------------------------|---------|-----------|-----------|-------------------|
|                   | Level 1                       | Level 2 | Level 3   | Total     |                   |
|                   | (Dollars in thousands)        |         |           |           |                   |
| December 31, 2015 | \$ —                          | \$ —    | \$ 33,711 | \$ 33,711 | \$ (11,792)       |
| December 31, 2014 | \$ —                          | \$ —    | \$ 37,400 | \$ 37,400 | \$ (21,566)       |
| December 31, 2013 | \$ —                          | \$ —    | \$ 13,000 | \$ 13,000 | \$ (7,484)        |

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The inputs to the valuation techniques used to measure fair value are classified into the following categories:

Level 1: Quoted market prices in active markets for identical assets or liabilities.

Level 2: Observable market-based inputs or unobservable inputs that are corroborated by market data.

Level 3: Unobservable inputs that are not corroborated by market data.

## 7. Goodwill and Other Intangible Assets

Details and activity in the Company's goodwill by segment are as follows:

|                               | Performance<br>Coatings<br>(Dollars in thousands) | Pigments,<br>and<br>Oxides | Performance<br>Colors and<br>Glass | Total      |
|-------------------------------|---|----------------------------|------------------------------------|------------|
| Balances at December 31, 2013 |   |                            |                                    |            |
| Gross goodwill                | \$ 45,855   | 9,508                      | 53,379                             | \$ 108,742 |
| Accumulated impairment losses | (45,269)  | —                          | —                                  | (45,269)   |
|                               | 586   | 9,508                      | 53,379                             | 63,473     |
| Acquisitions                  | 31,423 (1)  | —                          | 1,008 (1)                          | 32,431     |
| Other adjustments             | —   | (19)                       | (90)                               | (109)      |
| Foreign currency adjustments  | (418)   | 187                        | (1,831)                            | (2,062)    |
| Balances at December 31, 2014 |   |                            |                                    |            |
| Gross goodwill                | 76,860  | 9,676                      | 52,466                             | 139,002    |
| Accumulated impairment losses | (45,269)  | —                          | —                                  | (45,269)   |
|                               | 31,591  | 9,676                      | 52,466                             | 93,733     |
| Acquisitions                  | 14,305 (4)  | 39,151 (2)                 | 2,477 (3)                          | 55,933     |
| Other adjustments             | (462)   | —                          | —                                  | (462)      |
| Foreign currency adjustments  | (1,950)   | (33)                       | (1,552)                            | (3,535)    |
| Balances at December 31, 2015 |   |                            |                                    |            |
| Gross goodwill                | 88,753  | 48,794                     | 53,391                             | 190,938    |
| Accumulated impairment losses | (45,269)  | —                          | —                                  | (45,269)   |
|                               | \$ 43,484   | \$ 48,794                  | \$ 53,391                          | \$ 145,669 |

(1) During 2014, the Company recorded goodwill related to the Vetriceramici acquisition. Refer to Note 4 for additional details.

(2) During 2015, the Company recorded goodwill related to the Nubiola acquisition. Refer to Note 4 for additional details.

(3) During 2015, the Company recorded goodwill related to the TherMark acquisition. Refer to Note 4 for additional details.

(4) During 2015, the Company recorded goodwill related to the Al Salomi acquisition. Refer to Note 4 for additional details.

The significant assumptions and ranges of assumptions we used in our impairment analysis of goodwill follow:

| Significant Assumptions          | 2015            | 2014           |
|----------------------------------|-----------------|----------------|
| Weighted-average cost of capital | 11.5% - 12.75 % | 12.0% - 12.5 % |
| Residual growth rate             | 3.0 %           | 3.0 %          |

During the fourth quarter of 2015 and 2014, we performed our annual goodwill impairment testing. The test entailed comparing the fair value of our reporting units to their carrying value as of the measurement date of October 31, 2015 and October 31, 2014, respectively. We performed step 1 of the annual impairment test as defined in ASC Topic 350, Intangibles - Goodwill and Other. The

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result of the test was that there were no indicators of impairment. The Company is not aware of any events or circumstances that occurred which would require a goodwill impairment test as of December 31, 2015. The Company preliminary recorded goodwill of \$14.3 million related to the acquisition of Al Salomi during the fourth quarter of 2015. There were no indicators of impairment between the acquisition date and December 31, 2015.

Amortizable intangible assets at December 31 consisted of the following:

|   | Estimated<br>Economic Life | 2015                   | 2014      |
|---|----------------------------|------------------------|-----------|
|   |                            | (Dollars in thousands) |           |
| Gross amortizable intangible assets:      |                            |                        |           |
| Patents                                   | 10 - 16 years              | \$ 5,229               | \$ 5,404  |
| Land rights                               | 20 - 40 years              | 4,947                  | 5,091     |
| Technology/know-how and other             | 1- 30 years                | 66,558                 | 25,787    |
| Customer relationships                    | 12 - 20 years              | 46,320                 | 32,591    |
| Total gross amortizable intangible assets |                            | 123,054                | 68,873    |
| Accumulated amortization:                 |                            |                        |           |
| Patents                                   |                            | (4,880)                | (4,866)   |
| Land rights                               |                            | (2,671)                | (2,614)   |
| Technology/know-how and other             |                            | (16,473)               | (7,766)   |
| Customer relationships                    |                            | (2,234)                | (382)     |
| Total accumulated amortization            |                            | (26,258)               | (15,628)  |
| Amortizable intangible assets, net        |                            | \$ 96,796              | \$ 53,245 |

Indefinite-lived intangible assets at December 31 consisted of the following:

|                                      | 2015                      | 2014     |
|--------------------------------------|---------------------------|----------|
|                                      | (Dollars in<br>thousands) |          |
| Indefinite-lived intangibles assets: |                           |          |
| Trade names and trademarks           | \$ 9,837                  | \$ 4,064 |

In 2013, we determined it was more likely than not that the intangible asset associated with our grinding fluids operations would be disposed of significantly before the end of its previously determined useful life. At December 31, 2013, the net book value of the intangible asset was approximately \$2.1 million and it had a remaining useful life of approximately 11 years. We performed the analysis required under ASC Topic 350, Intangibles - Goodwill and Other, and concluded under step 1 that the carrying value of the intangible asset was not recoverable. Further analysis under step 2 resulted in an impairment of \$2.1 million. The fair value of the asset was determined utilizing the market approach based on bona fide third-party offers for the asset, a level 3 measurement in the fair value hierarchy. In 2014, the asset was sold.

| Description | Fair Value Measurements Using |         |         | Total<br>(Losses) |
|-------------|-------------------------------|---------|---------|-------------------|
|             | Fair Value                    | Level 1 | Level 2 |                   |
|             |                               |         |         |                   |

Amortizable intangible asset:

2013 \$ — \$ — \$ — \$ — \$ (2,102)

We amortize amortizable intangible assets on a straight-line basis over the estimated useful lives of the assets. Amortization expense related to amortizable intangible assets was \$4.9 million for 2015, \$2.3 million for 2014, and \$2.5 million for 2013. Aggregate amortization expense for amortizable intangible assets is expected to be approximately \$8.9 million for 2016, \$8.5 million for 2017, \$8.1 million for 2018, \$7.5 million for 2019, and \$6.9 million for 2020.



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## 8. Debt and Other Financing

Loans payable and current portion of long-term debt at December 31 consisted of the following:

|   | 2015                   | 2014     |
|---|------------------------|----------|
|   | (Dollars in thousands) |          |
| Loans payable                                       | \$ 2,749               | \$ 4,284 |
| Current portion of long-term debt                   | 4,697                  | 4,098    |
| Loans payable and current portion of long-term debt | \$ 7,446               | \$ 8,382 |

Long-term debt at December 31 consisted of the following:

|   | 2015                   | 2014       |
|---|------------------------|------------|
|   | (Dollars in thousands) |            |
| Revolving credit facility                             | \$ 170,000             | \$ —       |
| Term loan facility, net of unamortized issuance costs | 291,717                | 293,906    |
| Capital lease obligations                             | 4,478                  | 4,973      |
| Other notes   | 4,610                  | 3,504      |
| Total long-term debt                                  | 470,805                | 302,383    |
| Current portion of long-term debt                     | (4,697)                | (4,098)    |
| Long-term debt, less current portion                  | \$ 466,108             | \$ 298,285 |

The annual maturities of long-term debt for each of the five years after December 31, 2015, are as follows (in thousands):

|      |          |
|------|----------|
| 2016 | \$ 4,998 |
|------|----------|

|   |            |
|---|------------|
| 2017  | 4,946      |
| 2018  | 4,744      |
| 2019  | 173,992    |
| 2020  | 3,717      |
| Thereafter  | 284,421    |
| Total maturities of long-term debt                                    | 476,818    |
| Unamortized issuance costs on Term loan facility                      | (4,532)    |
| Imputed interest and executory costs on capitalized lease obligations | (1,481)    |
| Total long-term debt  | \$ 470,805 |

### Credit Facility

On July 31, 2014, the Company entered into a new credit facility (the “Credit Facility”) with a group of lenders to refinance the majority of its then outstanding debt. The Credit Facility consists of a \$200 million secured revolving line of credit with a term of five years and a \$300 million secured term loan facility with a term of seven years. The Credit Facility replaces the prior \$250 million revolving credit facility (described below) and provided funding to repurchase the 7.875% Senior Notes (described below). Subject to certain conditions, the Company can request up to \$200 million of additional commitments under the Credit Facility, though the lenders are not required to provide such additional commitments. In addition, up to \$100 million of the revolving line of credit will be available to certain of the Company’s subsidiaries in the form of revolving loans denominated in Euros.

Certain of the Company’s U.S. subsidiaries have guaranteed the Company’s obligations under the Credit Facility and such obligations are secured by (a) substantially all of the personal property of the Company and the U.S. subsidiary guarantors and (b) a pledge of 100% of the stock of most of the Company’s U.S. subsidiaries and 65% of most of the stock of the Company’s first tier foreign subsidiaries.

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**Interest Rate – Term Loan:** The interest rates applicable to the term loans will be, at the Company’s option, equal to either a base rate or a London Interbank Offered Rate (“LIBOR”) rate plus, in both cases, an applicable margin.

- The base rate will be the highest of (i) the federal funds rate plus 0.50%, (ii) PNC’s prime rate or (iii) the daily LIBOR rate plus 1.00%.
  - The applicable margin for base rate loans is 2.25%.
  - The LIBOR rate will be set as quoted by Bloomberg and shall not be less than 0.75%.
  - The applicable margin for LIBOR rate loans is 3.25%.
  - For LIBOR rate loans, the Company may choose to set the duration on individual borrowings for periods of one, two, three or six months, with the interest rate based on the applicable LIBOR rate for the corresponding duration.
- At December 31, 2015, the Company had borrowed \$296.3 million under the term loan facility at an annual rate of 4.0%. There were no additional borrowings available under the term loan facility.

**Interest Rate – Revolving Credit Line:** The interest rates applicable to loans under the revolving credit line will be, at the Company’s option, equal to either a base rate or a LIBOR rate plus an applicable variable margin. The variable margin will be based on the ratio of (a) the Company’s total consolidated debt outstanding at such time to (b) the Company’s consolidated EBITDA computed for the period of four consecutive fiscal quarters most recently ended.

- The base rate will be the highest of (i) the federal funds rate plus 0.50%, (ii) PNC’s prime rate or (iii) the daily LIBOR rate plus 1.00%.
  - The applicable margin for base rate loans will vary between 1.50% and 2.00%.
  - The LIBOR rate will be set as quoted by Bloomberg for U.S. Dollars.
  - The applicable margin for LIBOR Rate Loans will vary between 2.50% and 3.00%.
  - For LIBOR rate loans, the Company may choose to set the duration on individual borrowings for periods of one, two, three or six months, with the interest rate based on the applicable LIBOR rate for the corresponding duration.
- At December 31, 2015, the Company had borrowed \$170.0 million under the revolving credit facilities at a weighted average interest rate of 3.1%. The borrowings on the revolving credit line were used to fund the acquisitions, the share repurchase program, and for other general business use. After reductions for outstanding letters of credit secured by these facilities, we had \$25.6 million of additional borrowings available at December 31, 2015.

The Credit Facility contains customary restrictive covenants including, but not limited to, limitations on use of loan proceeds, limitations on the Company’s ability to pay dividends and repurchase stock, limitations on acquisitions and dispositions, and limitations on certain types of investments. The Credit Facility also contains standard provisions relating to conditions of borrowing and customary events of default, including the non-payment of obligations by the Company and the bankruptcy of the Company.

Specific to the revolving credit facility, the Company is subject to financial covenants regarding the Company’s outstanding net indebtedness and interest coverage ratios.

If an event of default occurs, all amounts outstanding under the Credit Facility may be accelerated and become immediately due and payable. At December 31, 2015, we were in compliance with the covenants of the Credit Facility.

7.875% Senior Notes and 2013 Revolving Credit Facility

In conjunction with the redemption of the 7.875% Senior Notes and the termination of the 2013 Revolving Credit Facility in the third quarter of 2014, the Company recorded a charge of \$14.4 million, which is comprised of a repurchase premium of \$10.5 million

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and the write-off of unamortized issuance costs of \$3.9 million. This charge is included within Loss on debt extinguishment in the consolidated statements of operations for the year ended December 31, 2014.

## Other Financing Arrangements

We maintain other lines of credit to provide global flexibility for Ferro's short-term liquidity requirements. These facilities are uncommitted lines for our international operations and totaled \$8.0 million at December 31, 2015, and \$10.8 million at December 31, 2014. The unused portions of these lines provided additional liquidity of \$7.3 million at December 31, 2015, and \$9.3 million at December 31, 2014.

## 9. Financial Instruments

The following table presents financial instrument assets (liabilities) at the carrying amount, fair value and classification within the fair value hierarchy:

|   | December 31, 2015      |                  | Level 1    | Level 2   | Level 3 |
|---|------------------------|------------------|------------|-----------|---------|
|   | Carrying Amount        | Fair Value Total |            |           |         |
|   | (Dollars in thousands) |                  |            |           |         |
| Cash and cash equivalents               | \$ 58,380              | \$ 58,380        | \$ 58,380  | \$ —      | \$ —    |
| Loans payable                           | (2,749)                | (2,749)          | —          | (2,749)   | —       |
| Revolving credit facility               | (170,000)              | (169,019)        | —          | (169,019) | —       |
| Term loan facility(1)                   | (291,717)              | (297,552)        | —          | (297,552) | —       |
| Other long-term notes payable           | (4,610)                | (3,956)          | —          | (3,956)   | —       |
| Foreign currency forward contracts, net | (1,207)                | (1,207)          | —          | (1,207)   | —       |
|   | December 31, 2014      |                  |            |           |         |
|   | Carrying Amount        | Fair Value Total | Level 1    | Level 2   | Level 3 |
|   | (Dollars in thousands) |                  |            |           |         |
| Cash and cash equivalents               | \$ 140,500             | \$ 140,500       | \$ 140,500 | \$ —      | \$ —    |
| Loans payable                           | (4,284)                | (4,284)          | —          | (4,284)   | —       |
| Term loan facility(1)                   | (293,906)              | (310,453)        | —          | (310,453) | —       |
| Other long-term notes payable           | (3,504)                | (2,861)          | —          | (2,861)   | —       |
| Foreign currency forward contracts, net | 713                    | 713              | —          | 713       | —       |

(1) The carrying value of the term loan facility is net of unamortized debt issuance costs. Refer to Note 2 for additional details on the adoption of ASU 2015-03 as of December 31, 2015.

The fair values of cash and cash equivalents are based on the fair values of identical assets. The fair values of loans payable are based on the present value of expected future cash flows and approximate their carrying amounts due to the short periods to maturity. The fair values of the revolving credit facility, the term loan facility and the other long-term notes are based on the present value of expected future cash flows and interest rates that would be currently available to the company for issuance of similar types of debt instruments with similar terms remaining maturities adjusted for the Company's non-performance risk.

#### Derivative Instruments

Foreign currency forward contracts. We manage foreign currency risks principally by entering into forward contracts to mitigate the impact of currency fluctuations on transactions. These forward contracts are not formally designated as hedges. Gains and losses on these foreign currency forward contracts are netted with gains and losses from currency fluctuations on transactions arising from international trade, primarily intercompany transactions, and reported as Foreign currency losses, net in the consolidated statements of operations. Net foreign currency loss was approximately \$4.5 million in 2015, \$1.2 million in 2014, and \$4.2 million in 2013, which is primarily comprised of the foreign exchange impact on transactions in countries where it is not economically feasible for us to enter into hedging arrangements and hedging inefficiencies, such as timing of transactions. In 2015, the net foreign currency loss includes a loss on a foreign currency contract related to the Euro dominated purchase of the Nubiola acquisition of \$2.7 million. We incurred net gains

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of \$8.3 million in 2015, net gains of \$10.5 million in 2014 and net losses of \$8.1 million in 2013, arising from the change in fair value of our financial instruments, which are netted against the related net gains and losses on international trade transactions. The fair values of these contracts are based on market prices for comparable contracts. The notional amount of foreign currency forward contracts was \$338.4 million at December 31, 2015, and \$145.9 million at December 31, 2014.

The following table presents the effect on our consolidated statements of operations for the years ended December 31, 2015, 2014 and 2013, respectively, of foreign currency forward contracts:

|                                    | Amount of Gain (Loss)<br>Recognized in Earnings |           |            |                                     |
|------------------------------------|---|-----------|------------|-------------------------------------|
|                                    | 2015  | 2014      | 2013       | Location of Gain (Loss) in Earnings |
|                                    | (Dollars in thousands)                          |           |            |                                     |
| Foreign currency forward contracts | \$ 8,304  | \$ 10,526 | \$ (8,060) | Foreign currency losses, net        |

The following table presents the fair value on our consolidated balance sheets at December 31 of foreign currency forward contracts:

|                                    | 2015                   | 2014     | Balance Sheet Location                         |
|------------------------------------|------------------------|----------|--|
|                                    | (Dollars in thousands) |          |  |
| Asset derivatives:                 |                        |          |  |
| Foreign currency forward contracts | \$ 913                 | \$ 1,599 | Other current assets                           |
| Liability derivatives:             |                        |          |  |
| Foreign currency forward contracts | \$ (2,120)             | \$ (886) | Accrued expenses and other current liabilities |

## 10. Income Taxes

Income tax (benefit) expense is based on our earnings (losses) from continuing operations before income taxes as presented in the following table:

|         | 2015                   | 2014        | 2013      |
|---------|------------------------|-------------|-----------|
|         | (Dollars in thousands) |             |           |
| U.S.    | \$ 10,520              | \$ (69,868) | \$ 77,013 |
| Foreign | 44,263                 | 27,032      | 1,177     |
| Total   | \$ 54,783              | \$ (42,836) | \$ 78,190 |

Our income tax (benefit) expense from continuing operations consists of the following components:

|                                    | 2015                   | 2014        | 2013        |
|------------------------------------|------------------------|-------------|-------------|
|                                    | (Dollars in thousands) |             |             |
| Current:                           |                        |             |             |
| U.S. federal                       | \$ 146                 | \$ (25,712) | \$ (10,370) |
| Foreign                            | 21,041                 | 12,181      | 18,761      |
| State and local                    | 41                     | (1,272)     | 165         |
| Total current                      | 21,228                 | (14,803)    | 8,556       |
| Deferred:                          |                        |             |             |
| U.S. federal                       | (56,521)               | 1,168       | 12,145      |
| Foreign                            | (3,764)                | (20,684)    | (6,416)     |
| State and local                    | (6,043)                | 92          | —           |
| Total deferred                     | (66,328)               | (19,424)    | 5,729       |
| Total income tax (benefit) expense | \$ (45,100)            | \$ (34,227) | \$ 14,285   |



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In addition, income tax (benefit) expense that we allocated directly to Ferro Corporation shareholders' equity is detailed in the following table:

|  | 2015                   | 2014     | 2013     |
|--|------------------------|----------|----------|
|  | (Dollars in thousands) |          |          |
| Postretirement benefit liability adjustments   | \$ 32                  | \$ (45)  | \$ (244) |
| Stock options exercised  | —                      | (835)    | —        |
| Total income tax expense (benefit) allocated to Ferro Corporation shareholders' equity | \$ 32                  | \$ (880) | \$ (244) |

A reconciliation of the U.S. federal statutory income tax rate and our effective tax rate follows:

|   | 2015     | 2014   | 2013   |
|---|----------|--------|--------|
| U.S. federal statutory income tax rate                                | 35.0 %   | 35.0 % | 35.0 % |
| Expired tax attributes  | 16.2     | (9.9)  | 8.7    |
| Uncertain tax positions   | 4.3      | (4.3)  | 0.4    |
| Tax rate changes  | 3.4      | (4.6)  | (0.7)  |
| Non-deductible expenses   | 3.0      | —      | —      |
| Foreign currency  | 2.3      | (0.1)  | 0.1    |
| U.S. tax costs of foreign dividends                                   | 1.7      | 4.7    | 1.7    |
| Miscellaneous   | 1.6      | (6.7)  | 1.5    |
| State taxes   | 0.6      | 5.4    | (0.5)  |
| Net adjustment of prior-year accrual, including tax audit settlements | 0.2      | (8.1)  | 2.0    |
| Goodwill dispositions and impairments                                 | (0.2)    | 0.8    | (0.3)  |
| Foreign substitute tax payment  | (3.9)    | —      | —      |
| Other tax credits   | (5.1)    | 7.8    | —      |
| Foreign tax rate difference   | (6.9)    | 16.2   | 0.4    |
| Adjustment of valuation allowances                                    | (134.5)  | 40.6   | (27.0) |
| Domestic production activities deduction                              | —        | 3.1    | —      |
| Book to tax difference on sale of assets                              | —        | —      | (3.0)  |
| Effective tax rate  | (82.3) % | 79.9 % | 18.3 % |

We have refundable income taxes of \$5.6 million at December 31, 2015, and \$4.0 million at December 31, 2014, classified as Other receivables on our consolidated balance sheets. We also have income taxes payable of \$8.6 million at December 31, 2015, and \$11.1 million at December 31, 2014, classified as Accrued expenses and other current liabilities on our consolidated balance sheets.

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The components of deferred tax assets and liabilities at December 31 were:

|  | 2015                   | 2014      |
|--|------------------------|-----------|
|  | (Dollars in thousands) |           |
| Deferred tax assets:   |                        |           |
| Pension and other benefit programs   | \$ 46,348              | \$ 51,510 |
| Foreign operating loss carryforwards   | 35,925                 | 54,323    |
| Foreign tax credit carryforwards   | 23,620                 | 24,646    |
| Accrued liabilities  | 19,036                 | 18,277    |
| Other credit carryforwards   | 13,379                 | 13,882    |
| State operating loss carryforwards   | 4,540                  | 4,860     |
| Other  | 3,955                  | 5,954     |
| Inventories  | 2,454                  | 2,609     |
| Domestic operating loss carryforwards  | 1,837                  | —         |
| Capitalized interest   | 1,749                  | 3,402     |
| Allowance for doubtful accounts  | 1,701                  | 2,500     |
| Capitalized research costs   | 552                    | 1,747     |
| Total deferred tax assets  | 155,096                | 183,710   |
| Deferred tax liabilities:  |                        |           |
| Property, plant and equipment and intangibles -- depreciation and amortization | 26,051                 | 4,176     |
| Other  | 2,475                  | 327       |
| Unremitted earnings of foreign subsidiaries                                    | 616                    | 894       |
| Total deferred tax liabilities   | 29,142                 | 5,397     |
| Net deferred tax assets before valuation allowance                             | 125,954                | 178,313   |
| Valuation allowance  | (55,043)               | (147,887) |
| Net deferred tax assets  | \$ 70,911              | \$ 30,426 |

The amounts of foreign operating loss carryforwards, foreign tax credit carryforwards, and other credit carryforwards included in the table of temporary differences are net of reserves for unrecognized tax benefits.

At December 31, 2015, we had \$5.0 million of tax benefits from federal and state operating loss carryforwards and \$39.4 million from foreign operating loss carryforwards, some of which can be carried forward indefinitely and others that expire in one to twenty years. At December 31, 2015, we had \$47.5 million of tax benefits from tax credit carryforwards, some of which can be carried forward indefinitely. These operating loss carryforwards and tax credit carryforwards expire as follows:

| Expiring in:      | Operating              | Tax Credit    |
|-------------------|------------------------|---------------|
|                   | Loss                   | Carryforwards |
|                   | (Dollars in thousands) |               |
| 2016              | \$ 2,853               | \$ 6,368      |
| 2017-2021         | 11,556                 | 15,235        |
| 2022-2026         | 2,600                  | 17,430        |
| 2027-2031         | 1,036                  | 5,282         |
| 2032-2036         | 4,407                  | 761           |
| 2037-Indefinitely | 21,993                 | 2,462         |
| Total             | \$ 44,445              | \$ 47,538     |

We assess the available positive and negative evidence to estimate if sufficient future taxable income will be generated to utilize the existing deferred tax assets. A significant piece of objective negative evidence evaluated by jurisdiction was the cumulative loss incurred over the three year period ended December 31, 2015. Such objective evidence limits the ability to consider other subjective evidence such as our projections for future income.

Based on this assessment, the Company has recorded a valuation allowance of \$55.0 million in order to measure only the portion of the deferred tax assets that more likely than not will be realized. The most significant items that decreased the valuation allowance from 2014 to 2015 primarily related to the removal of a partial valuation allowance in a select jurisdiction.

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We classified net deferred income tax assets as of December 31 as detailed in the following table:

|                         | 2015                   | 2014      |
|-------------------------|------------------------|-----------|
|                         | (Dollars in thousands) |           |
| Current assets          | \$ 12,088              | \$ 7,532  |
| Non-current assets      | 87,385                 | 40,275    |
| Current liabilities     | (1,074)                | (1,298)   |
| Non-current liabilities | (27,488)               | (16,083)  |
| Net deferred tax assets | \$ 70,911              | \$ 30,426 |

Activity and balances of unrecognized tax benefits are summarized below:

|  | 2015                   | 2014      | 2013      |
|--|------------------------|-----------|-----------|
|  | (Dollars in thousands) |           |           |
| Balance at beginning of year   | \$ 36,879              | \$ 38,739 | \$ 28,686 |
| Additions based on tax positions related to the current year         | 2,664                  | 3,411     | 3,701     |
| Additions for tax positions of prior years                           | 4,136                  | 1,908     | 8,524     |
| Reductions for tax positions of prior years                          | (1,135)                | (2,551)   | (153)     |
| Reductions as a results of expiring statutes of limitations          | (6,259)                | (700)     | (449)     |
| Foreign currency translation of non-U.S. dollar denominated reserves | (1,744)                | (1,953)   | 292       |
| Settlements with taxing authorities                                  | —                      | (1,975)   | (1,862)   |
| Balance at end of year   | \$ 34,541              | \$ 36,879 | \$ 38,739 |

The total amount of unrecognized tax benefits that, if recognized, would affect the effective rate was \$11.0 million at December 31, 2015, and \$13.4 million at December 31, 2014. The Company recognizes interest accrued and penalties related to unrecognized tax benefits as part of income tax expense. The Company recognized \$0.6 million of expense in 2015, \$0.9 million of benefit in 2014, and \$1.3 million of expense in 2013 for interest, net of tax, and penalties. The Company accrued \$3.1 million at December 31, 2015, and \$1.1 million at December 31, 2014, for payment of interest, net of tax, and penalties.

We anticipate that \$2.5 million of liabilities for unrecognized tax benefits, including accrued interest and penalties, may be reversed within the next 12 months. These liabilities relate to international tax issues and are expected to reverse due to the expiration of the applicable statute of limitations periods and the anticipation of the closure of tax examinations.

The Company conducts business globally, and, as a result, the U.S. parent company or one of its subsidiaries files income tax returns in the U.S. federal jurisdiction and various state and foreign jurisdictions. In the normal course of business, the U.S. parent company and its subsidiaries are subject to examination by taxing authorities throughout the world. With few exceptions, we are not subject to federal, state, local or non-U.S. income tax examinations for years before 2004.

At December 31, 2015, we provided \$0.6 million for deferred income taxes on \$7.0 million of undistributed earnings of foreign subsidiaries. We have not provided deferred income taxes on undistributed earnings of approximately \$45.7 million, since we intend to indefinitely reinvest the earnings and it is not practicable to estimate the additional taxes that might be payable on the eventual remittance of such earnings.

## 11. Contingent Liabilities

The Company had bank guarantees and standby letters of credit issued by financial institutions that totaled \$8.1 million at December 31, 2015, and \$7.3 million at December 31, 2014. These agreements primarily relate to Ferro's insurance programs, foreign energy purchase contracts and foreign tax payments. If the Company fails to perform its obligations, the guarantees and letters of credit may be drawn down by their holders, and we would be liable to the financial institutions for the amounts drawn.

We have recorded environmental liabilities of \$7.4 million at December 31, 2015, and \$10.1 million at December 31, 2014, for costs associated with the remediation of certain of our properties that have been contaminated. The balance at December 31, 2015, and December 31, 2014, was primarily comprised of liabilities related to a non-operating facility in Brazil, and for retained environmental

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obligations related to a site in the United States that was part of the sale of our North American and Asian metal powders product lines in the fourth quarter of 2013. The costs include legal and consulting fees, site studies, the design and implementation of remediation plans, post-remediation monitoring, and related activities. The ultimate liability could be affected by numerous uncertainties, including the extent of contamination found, the required period of monitoring and the ultimate cost of required remediation.

In 2013, the Supreme Court in Argentina ruled unfavorably related to certain export taxes associated with a divested operation. As a result of this ruling, we have recorded a liability of \$7.8 million at December 31, 2015, and \$6.9 million at December 31, 2014. The liability that has been recorded represents our estimate of the amount that is probable and estimable.

There are various lawsuits and claims pending against the Company and its consolidated subsidiaries. We do not currently expect the ultimate liabilities, if any, and expenses related to such lawsuits and claims to materially affect the consolidated financial position, results of operations, or cash flows of the Company.

## 12. Retirement Benefits

## Defined Benefit Pension Plans

|   | U.S. Pension Plans     |           |             | Non-U.S. Plans |           |          |
|---|------------------------|-----------|-------------|----------------|-----------|----------|
|   | 2015                   | 2014      | 2013        | 2015           | 2014      | 2013     |
|   | (Dollars in thousands) |           |             |                |           |          |
| Service cost                                      | \$ 17                  | \$ 16     | \$ 19       | \$ 1,478       | \$ 1,767  | \$ 2,095 |
| Interest cost                                     | 18,718                 | 19,746    | 18,123      | 3,560          | 5,105     | 4,927    |
| Expected return on plan assets                    | (29,168)               | (28,139)  | (24,730)    | (2,623)        | (3,151)   | (2,994)  |
| Amortization of prior service cost                | 12                     | 12        | 13          | 259            | 61        | 29       |
| Mark-to-market actuarial net losses (gains)       | 18,807                 | 71,583    | (63,405)    | 5,085          | 17,494    | (2,506)  |
| Curtailment and settlement effects (gains) losses | (12,640)               | —         | —           | 35             | (123)     | (632)    |
| Special termination benefits                      | —                      | —         | —           | 35             | 40        | 96       |
| Net periodic benefit (credit) cost                | \$ (4,254)             | \$ 63,218 | \$ (69,980) | \$ 7,829       | \$ 21,193 | \$ 1,015 |
| Weighted-average assumptions:                     |                        |           |             |                |           |          |
| Discount rate                                     | 4.25 %                 | 5.25 %    | 4.30 %      | 2.72 %         | 4.12 %    | 4.00 %   |
| Rate of compensation increase                     | N/A                    | N/A       | N/A         | 3.28 %         | 2.88 %    | 2.89 %   |
| Expected return on plan assets                    | 8.20 %                 | 8.20 %    | 8.20 %      | 3.50 %         | 4.44 %    | 4.45 %   |

In 2015, the mark-to-market actuarial net loss on the U.S. pension plans of \$18.8 million primarily consisted of \$20.8 million of loss from expected returns on plan assets exceeding actual returns, partially offset by an increase in the discount rate compared with the prior year. The mark-to-market actuarial net loss of \$5.1 million for non-U.S. plans primarily consisted of \$11.0 million of loss from expected returns on plan assets exceeding actual returns, partially offset by an increase in the discount rate. In 2015, the Company initiated and executed on a buyout of terminated vested participants in our U.S. defined benefit pension plan. In October 2015, the buyout was funded and reduced plan assets and liability by \$71 million and resulted in a settlement gain of \$12.6 million.

In 2014, the mark-to-market actuarial net loss on the U.S. pension plans of \$71.6 million consisted of \$69.8 million of losses due to a decrease in the discount rate compared with the prior year and a change in the underlying mortality assumption, in addition to \$1.8 million of loss from expected returns on plan assets exceeding actual returns. In 2014, the discount rate used to value the liability declined by 100 basis points compared with the prior year, thereby increasing the value of the liability by \$50.3 million. Additionally, during the fourth quarter of 2014, the Company adopted the use of new mortality tables within its valuation assumptions, which increased the liability. The new mortality tables reflect underlying increases in life expectancy of the participants, thus driving longer benefit payment periods. The impact of the change in mortality assumption on the U.S. pension liability was an increase of \$17.8 million. The mark-to-market actuarial net loss of \$17.5 million for non-U.S. plans primarily consisted of \$30.8 million of losses due to decreases in the respective plans' discount rates and the change in mortality assumptions compared with 2014, partially offset by \$13.2 million of gains from actual returns on plan assets exceeding expectations.

In 2013, the mark-to-market actuarial net gain of \$63.4 million consisted of \$38.0 million for U.S. plans primarily due to an increase in the discount rate, in addition to \$25.6 million of gains from actual returns on plan assets exceeding expected returns. The mark-to-market actuarial net gains for non-U.S. plans of \$2.5 million consisted of \$0.6 million gain primarily due to an increase in the



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discount rate, in addition to \$1.9 million of gains from actual returns on plan assets exceeding expectations. Also in 2013, we recorded curtailment gains related to the cessation of retirement benefit accumulations in Japan.

|  | U.S. Pension Plans     |             | Non-U.S. Pension Plans |             |
|--|------------------------|-------------|------------------------|-------------|
|  | 2015                   | 2014        | 2015                   | 2014        |
|  | (Dollars in thousands) |             |                        |             |
| Change in benefit obligation                   |                        |             |                        |             |
| Benefit obligation at beginning of year        | \$ 454,030             | \$ 386,718  | \$ 146,706             | \$ 129,726  |
| Service cost                                   | 17                     | 16          | 1,478                  | 1,767       |
| Interest cost                                  | 18,718                 | 19,746      | 3,560                  | 5,105       |
| Curtailments                                   | —                      | —           | —                      | (122)       |
| Amendments                                     | —                      | —           | 189                    | 4           |
| Settlements                                    | (71,290)               | —           | (579)                  | (771)       |
| Special termination benefits                   | —                      | —           | 35                     | 40          |
| Plan participants' contributions               | —                      | —           | 20                     | 41          |
| Benefits paid                                  | (23,144)               | (22,223)    | (3,179)                | (3,956)     |
| Actuarial (gain) loss                          | (31,380)               | 69,773      | (11,142)               | 30,810      |
| Exchange rate effect                           | —                      | —           | (13,324)               | (15,938)    |
| Benefit obligation at end of year              | \$ 346,951             | \$ 454,030  | \$ 123,764             | \$ 146,706  |
| Accumulated benefit obligation at end of year  | \$ 346,951             | \$ 454,030  | \$ 118,680             | \$ 139,819  |
| Change in plan assets:                         |                        |             |                        |             |
| Fair value of plan assets at beginning of year | \$ 381,147             | \$ 354,670  | \$ 82,345              | \$ 73,610   |
| Actual return on plan assets                   | (8,379)                | 26,329      | (13,638)               | 16,353      |
| Employer contributions                         | 401                    | 22,371      | 4,979                  | 4,622       |
| Plan participants' contributions               | —                      | —           | 20                     | 41          |
| Benefits paid                                  | (23,144)               | (22,223)    | (3,179)                | (3,956)     |
| Effect of settlements                          | (71,290)               | —           | (579)                  | (771)       |
| Exchange rate effect                           | —                      | —           | (6,299)                | (7,554)     |
| Fair value of plan assets at end of year       | \$ 278,735             | \$ 381,147  | \$ 63,649              | \$ 82,345   |
| Amounts recognized in the balance sheet:       |                        |             |                        |             |
| Other non-current assets                       | \$ —                   | \$ —        | \$ 841                 | \$ 8,015    |
| Accrued expenses and other current liabilities | (729)                  | (570)       | (1,834)                | (1,964)     |
| Postretirement and pension liabilities         | (67,487)               | (72,312)    | (59,122)               | (70,412)    |
| Funded status                                  | \$ (68,216)            | \$ (72,882) | \$ (60,115)            | \$ (64,361) |

|  | U.S. Pension Plans |            | Non-U.S. Pension Plans |           |      |      |
|--|--------------------|------------|------------------------|-----------|------|------|
|  | 2015               | 2014       | 2015                   | 2014      | 2015 | 2014 |
| Weighted-average assumptions as of December 31:                              |                    |            |                        |           |      |      |
| Discount rate  | 4.70               | % 4.25     | % 3.12                 | % 2.72    | %    | %    |
| Rate of compensation increase  | N/A                | N/A        | 3.16                   | % 3.28    | %    | %    |
| Pension plans with benefit obligations in excess of plan assets:             |                    |            |                        |           |      |      |
| Benefit obligations  | \$ 346,951         | \$ 454,030 | \$ 66,291              | \$ 77,646 |      |      |
| Plan assets  | 278,735            | 381,147    | 5,336                  | 5,271     |      |      |
| Pension plans with accumulated benefit obligations in excess of plan assets: |                    |            |                        |           |      |      |
| Projected benefit obligations  | \$ 346,951         | \$ 454,030 | \$ 65,777              | \$ 77,419 |      |      |
| Accumulated benefit obligations  | 346,951            | 454,030    | 60,888                 | 71,544    |      |      |
| Plan assets  | 278,735            | 381,147    | 4,881                  | 5,073     |      |      |

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Activity and balances in Accumulated other comprehensive loss related to defined benefit pension plans are summarized below:

|  | U.S. Pension<br>Plans  |         | Non-U.S.<br>Pension Plans |          |
|--|------------------------|---------|---------------------------|----------|
|  | 2015                   | 2014    | 2015                      | 2014     |
|  | (Dollars in thousands) |         |                           |          |
| Prior service (cost):                            |                        |         |                           |          |
| Balance at beginning of year                     | \$ (30)                | \$ (42) | \$ (636)                  | \$ (660) |
| Amounts recognized as net periodic benefit costs | 12                     | 12      | 259                       | 61       |
| Exchange rate effects                            | —                      | —       | (48)                      | (37)     |
| Balance at end of year                           | \$ (18)                | \$ (30) | \$ (425)                  | \$ (636) |
| Estimated amounts to be amortized in 2016        | \$ (11)                |         | \$ (49)                   |          |

The overall investment objective for defined benefit pension plan assets is to achieve the highest level of investment return that is compatible with prudent investment practices, asset class risk and current and future benefit obligations of the plans. Based on the potential risks and expected returns of various asset classes, the Company establishes asset allocation ranges for major asset classes. For U.S. plans, the target allocations are 35% fixed income, 60% equity, and 5% other investments. For non-U.S. plans, the target allocations are 75% fixed income, 24% equity, and 1% other investments. The Company invests in funds and with asset managers that track broad investment indices. The equity funds generally capture the returns of the equity markets in the U.S., Europe, Japan, and Asia Pacific and also reflect various investment styles, such as growth, value, and large or small capitalization. The fixed income funds generally capture the returns of government and investment-grade corporate fixed income securities in the U.S. and Europe and also reflect various durations of these securities.

We base the expected return on plan assets at the beginning of the year on the weighted-average expected return for the target asset allocations of the major asset classes held by each plan. In determining the expected return, the Company considers both historical performance and an estimate of future long-term rates of return. The Company consults with and considers the opinion of its actuaries in developing appropriate return assumptions.

The fair values of our pension plan assets at December 31, 2015, by asset category are as follows:

|                           | Level 1                | Level 2 | Level 3 | Total  |
|---------------------------|------------------------|---------|---------|--------|
|                           | (Dollars in thousands) |         |         |        |
| U.S. plans:               |                        |         |         |        |
| Fixed income:             |                        |         |         |        |
| Cash and cash equivalents | \$ 44                  | \$ —    | \$ —    | \$ 44  |
| Guaranteed deposits       | —                      | 1,956   | —       | 1,956  |
| Mutual funds              | 88,672                 | —       | —       | 88,672 |

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|                           |            |          |           |            |
|---------------------------|------------|----------|-----------|------------|
| Commingled funds          | —          | 879      | 366       | 1,245      |
| Equities:                 |            |          |           |            |
| U.S. common stocks        | 3,148      | —        | —         | 3,148      |
| Mutual funds              | 162,332    | —        | —         | 162,332    |
| Commingled funds          | —          | 1,264    | —         | 1,264      |
| Real estate               | —          | —        | 20,074    | 20,074     |
| Total                     | \$ 254,196 | \$ 4,099 | \$ 20,440 | \$ 278,735 |
| Non-U.S. plans            |            |          |           |            |
| Fixed income:             |            |          |           |            |
| Cash and cash equivalents | \$ 299     | \$ —     | \$ —      | \$ 299     |
| Guaranteed deposits       | 142        | 2,148    | 54,006    | 56,296     |
| Mutual funds              | 171        | —        | —         | 171        |
| Other                     | 4,188      | 2,267    | —         | 6,455      |
| Equities:                 |            |          |           |            |
| Mutual funds              | 319        | —        | —         | 319        |
| Real estate               | —          | —        | 59        | 59         |
| Other assets              | 50         | —        | —         | 50         |
| Total                     | \$ 5,169   | \$ 4,415 | \$ 54,065 | \$ 63,649  |

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The fair values of our pension plan assets at December 31, 2014, by asset category are as follows:

|                           | Level 1                | Level 2   | Level 3   | Total      |
|---------------------------|------------------------|-----------|-----------|------------|
|                           | (Dollars in thousands) |           |           |            |
| U.S. plans:               |                        |           |           |            |
| Fixed income:             |                        |           |           |            |
| Cash and cash equivalents | \$ 23                  | \$ —      | \$ —      | \$ 23      |
| Guaranteed deposits       | —                      | 2,112     | —         | 2,112      |
| U.S. government agencies  | 18,450                 | —         | —         | 18,450     |
| Mutual funds              | 98,943                 | —         | —         | 98,943     |
| Commingled funds          | —                      | 1,381     | 489       | 1,870      |
| Equities:                 |                        |           |           |            |
| U.S. common stocks        | 3,669                  | —         | —         | 3,669      |
| Mutual funds              | 236,893                | —         | —         | 236,893    |
| Commingled funds          | —                      | 1,643     | —         | 1,643      |
| Real estate               | —                      | —         | 17,544    | 17,544     |
| Total                     | \$ 357,978             | \$ 5,136  | \$ 18,033 | \$ 381,147 |
| Non-U.S. plans            |                        |           |           |            |
| Fixed income:             |                        |           |           |            |
| Cash and cash equivalents | \$ 690                 | \$ —      | \$ —      | \$ 690     |
| Guaranteed deposits       | 113                    | 2,057     | 28,929    | 31,099     |
| Mutual funds              | 337                    | —         | —         | 337        |
| Commingled funds          | —                      | 25,330    | —         | 25,330     |
| Other                     | 4,584                  | 2,955     | —         | 7,539      |
| Equities:                 |                        |           |           |            |
| Mutual funds              | 357                    | —         | —         | 357        |
| Commingled funds          | —                      | 16,826    | —         | 16,826     |
| Real estate               | —                      | —         | 104       | 104        |
| Other assets              | 61                     | —         | 2         | 63         |
| Total                     | \$ 6,142               | \$ 47,168 | \$ 29,035 | \$ 82,345  |

The Company's U.S. pension plans held 0.3 million shares of the Company's common stock with a market value of \$3.1 million at December 31, 2015, and 0.3 million shares with a market value of \$3.7 million at December 31, 2014.

Level 3 assets consist primarily of guaranteed deposits and real estate investments. The guaranteed deposits in Level 3 are in the form of contracts with insurance companies that secure the payment of benefits and are valued based on discounted cash flow models using the same discount rate used to value the related plan liabilities. The real estate investments in Level 3 are in the form of commingled funds invested in non-public real estate development and investment companies and are valued based on estimated capitalization factors applied to the earnings streams from portfolio properties and fee income, discounted cash flows of development projects, and estimated market values of undeveloped land, all of which are reduced by reported liabilities and appropriate taxes.



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A rollforward of Level 3 assets is presented below. Unrealized gains included in earnings were \$0 million in 2015 and \$7.8 million in 2014.

|                                     | Guaranteed             | Real      | Commingled | Other  | Total     |
|-------------------------------------|------------------------|-----------|------------|--------|-----------|
|                                     | deposits               | estate    | funds      | assets |           |
|                                     | (Dollars in thousands) |           |            |        |           |
| Balance at December 31, 2013        | \$ 22,985              | \$ 16,163 | \$ 468     | \$ 200 | \$ 39,816 |
| Sales                               | —                      | (391)     | —          | (208)  | (599)     |
| Gains included in earnings          | 5,944                  | 1,889     | 21         | 3      | 7,857     |
| Exchange rate effect                | —                      | (13)      | —          | 7      | (6)       |
| Balance at December 31, 2014        | \$ 28,929              | \$ 17,648 | \$ 489     | \$ 2   | \$ 47,068 |
| Purchases                           | 31,157                 | —         | —          | —      | 31,157    |
| Sales                               | (282)                  | —         | —          | —      | (282)     |
| (Losses) gains included in earnings | (2,342)                | 2,485     | (123)      | (2)    | 18        |
| Exchange rate effect                | (3,456)                | —         | —          | —      | (3,456)   |
| Balance at December 31, 2015        | \$ 54,006              | \$ 20,133 | \$ 366     | \$ —   | \$ 74,505 |

We expect to contribute approximately \$0.7 million to our U.S. pension plans and \$1.9 million to our non-U.S. pension plans in 2016.

We estimate that future pension benefit payments, which reflect expected future service, will be as follows:

|           | U.S. Plans             | Non-U.S. Plans |
|-----------|------------------------|----------------|
|           | (Dollars in thousands) |                |
| 2016      | \$ 23,363              | \$ 4,967       |
| 2017      | 23,463                 | 5,067          |
| 2018      | 23,535                 | 4,856          |
| 2019      | 23,636                 | 5,757          |
| 2020      | 23,753                 | 5,447          |
| 2021-2025 | 118,839                | 29,577         |

## Postretirement Health Care and Life Insurance Benefit Plans

|   | 2015                   | 2014     | 2013       |
|---|------------------------|----------|------------|
|   | (Dollars in thousands) |          |            |
| Net periodic benefit cost:                |                        |          |            |
| Interest expense                          | \$ 970                 | \$ 1,205 | \$ 1,139   |
| Amortization of prior service credit      | —                      | (105)    | (115)      |
| Mark-to-market actuarial net (gain) loss  | (3,051)                | 499      | (3,904)    |
| Curtailement (gain) recognized            | —                      | (930)    | —          |
| Total net periodic benefit cost           | \$ (2,081)             | \$ 669   | \$ (2,880) |
| Weighted-average assumptions:             |                        |          |            |
| Discount rate                             | 3.95 %                 | 4.90 %   | 3.85 %     |
| Current trend rate for health care costs  | 7.10 %                 | 7.30 %   | 7.50 %     |
| Ultimate trend rate for health care costs | 4.50 %                 | 4.50 %   | 4.50 %     |
| Year that ultimate trend rate is reached  | 2028                   | 2028     | 2028       |



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A one-percentage-point change in the assumed health care cost trend rates would have the following effect:

|  | 1-Percentage-Point<br>Increase |  | 1-Percentage-Point<br>Decrease |  |
|--|--------------------------------|--|--------------------------------|--|
|  | (Dollars in thousands)         |  |                                |  |
| Effect on total of service and interest costs components | \$ 65                          |  | \$ (57)                        |  |
| Effect on postretirement benefit obligation              | 1,323                          |  | (1,158)                        |  |

|   | 2015                   |   | 2014        |   |
|---|------------------------|---|-------------|---|
|   | (Dollars in thousands) |   |             |   |
| Change in benefit obligation:                   |                        |   |             |   |
| Benefit obligation at beginning of year         | \$ 25,717              |   | \$ 25,811   |   |
| Interest cost                                   | 970                    |   | 1,205       |   |
| Curtailments                                    | —                      |   | (20)        |   |
| Benefits paid                                   | (1,606)                |   | (1,778)     |   |
| Actuarial (loss) gain                           | (3,051)                |   | 499         |   |
| Benefit obligation at end of year               | \$ 22,030              |   | \$ 25,717   |   |
| Change in plan assets:                          |                        |   |             |   |
| Fair value of plan assets at beginning of year  | \$ —                   |   | \$ —        |   |
| Employer contributions                          | 1,606                  |   | 1,778       |   |
| Benefits paid                                   | (1,606)                |   | (1,778)     |   |
| Fair value of plan assets at end of year        | \$ —                   |   | \$ —        |   |
| Amounts recognized in the balance sheet:        |                        |   |             |   |
| Accrued expenses and other current liabilities  | \$ (2,345)             |   | \$ (2,610)  |   |
| Postretirement and pension liabilities          | (19,685)               |   | (23,107)    |   |
| Funded status                                   | \$ (22,030)            |   | \$ (25,717) |   |
| Weighted-average assumptions as of December 31: |                        |   |             |   |
| Discount rate                                   | 4.50                   | % | 3.95        | % |
| Current trend rate for health care costs        | 6.60                   | % | 7.10        | % |
| Ultimate trend rate for health care costs       | 4.50                   | % | 4.50        | % |
| Year that ultimate trend rate is reached        | 2036                   |   | 2028        |   |

Activity and balances in Accumulated other comprehensive loss related to our postretirement health care and life insurance benefit plans are summarized below:

|  | 2015                   | 2014     |
|--|------------------------|----------|
|  | (Dollars in thousands) |          |
| Prior service credit:                            |                        |          |
| Balance at beginning of year                     | \$ —                   | \$ 1,015 |
| Amounts recognized as net periodic benefit costs | —                      | (1,015)  |
| Balance at end of year                           | \$ —                   | \$ —     |
| Estimated amounts to be amortized in 2016        | \$ —                   |          |

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The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 provides subsidies for certain drug costs to companies that provide coverage that is actuarially equivalent to the drug coverage under Medicare Part D. We estimate that future postretirement health care and life insurance benefit payments will be as follows:

|           | Before<br>Medicare<br>Subsidy<br>(Dollars in<br>thousands) | After<br>Medicare<br>Subsidy |
|-----------|--|------------------------------|
| 2016      | \$ 2,346   | \$ 2,088                     |
| 2017      | 2,277  | 2,028                        |
| 2018      | 2,200  | 1,960                        |
| 2019      | 2,122  | 1,893                        |
| 2020      | 2,031  | 1,813                        |
| 2021-2025 | 8,702  | 7,787                        |

## Other Retirement Plans

We also have defined contribution retirement plans covering certain employees. Our contributions are determined by the terms of the plans and are limited to amounts that are deductible for income taxes. Generally, benefits under these plans vest gradually over a period of five years from date of employment. The largest plan covers salaried and most hourly employees in the U.S. In this plan, the Company contributes a percentage of eligible employee basic compensation and also a percentage of employee contributions. The expense applicable to these plans was \$3.4 million, \$4.9 million, and \$5.8 million in 2015, 2014, and 2013, respectively.

## 13. Stock-based Compensation

On May 22, 2013, our shareholders approved the 2013 Omnibus Incentive Plan (the “Plan”), which was adopted by the Board of Directors on February 22, 2013, subject to shareholder approval. The Plan’s purpose is to promote the Company’s long-term financial interests and growth by attracting, retaining and motivating high quality key employees and directors, motivating such employees and directors to achieve the Company’s short- and long-range performance goals and objectives, thereby aligning their interests with those of its shareholders. The Plan reserves 4,400,000 shares of common stock to be issued for grants of several different types of long-term incentives including stock options, stock appreciation rights, restricted shares, performance shares, other common stock based awards, and dividend equivalent rights.

The 2010 Long Term Incentive Plan (the “Previous Plan”) was replaced by the Plan, and no future grants may be made under the Previous Plan. However, any outstanding awards or grants made under the Previous Plan will continue until

the end of their specified terms.

Stock options, performance share units, deferred stock units, and restricted share units were the only grant types outstanding at December 31, 2015. Stock options, performance share units, and restricted share units are discussed below. Activities in other grant types were not significant.

### Stock Options

#### General Information

Stock options outstanding at December 31, 2015, have a term of 10 years, vest evenly over three or four years on the anniversary of the grant date, and have an exercise price equal to the per share fair market value of our common stock on the grant date. Accelerated vesting is used for options held by employees who meet both the age and years of service requirements to retire prior to the end of the vesting period. In the case of death or retirement, the stock options become 100% vested and exercisable.

#### Stock Option Valuation Model and Method Information

We estimate the fair value of each stock option on the date of grant using the Black-Scholes option pricing model. We use judgment in selecting assumptions for the model, which may significantly impact the timing and amount of compensation expense, and we base

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our judgments primarily on historical data. When appropriate, we adjust the historical data for circumstances that are not likely to occur in the future.

The following table details the determination of the assumptions used to estimate the fair value of stock options:

| Assumption              | Estimation Method  |
|-------------------------|--|
| Expected life, in years | Historical stock option exercise experience  |
| Risk-free interest rate | Yield of U.S. Treasury Bonds with remaining maturity equal to expected life of the stock option                                |
| Expected volatility     | Historical daily price observations of the Company's common stock over a period equal to the expected life of the stock option |
| Expected dividend yield | Historical dividend rate at the date of grant  |

The following table details the weighted-average grant-date fair values and the assumptions used for estimating the fair values of stock options granted in the respective years:

|  | 2015           | 2014           | 2013           |
|--|----------------|----------------|----------------|
| Weighted-average grant-date fair value | \$ 8.45        | \$ 9.54        | \$ 4.01        |
| Expected life, in years                | 6.0            | 6.0            | 6.0            |
| Risk-free interest rate                | 1.9% - 2.1 %   | 2.0% - 2.2 %   | 1.1% - 1.4 %   |
| Expected volatility                    | 55.0% - 80.1 % | 82.7% - 86.3 % | 85.6% - 86.4 % |
| Expected dividend yield                | — %            | — %            | — %            |

## Stock Option Activity Information

A summary of stock option activity follows:

| Weighted- | Weighted- | Aggregate |
|-----------|-----------|-----------|
|           | Average   |           |
|           | Remaining |           |

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|   | Number of<br>Options | Average<br>Exercise Price | Contractual<br>Term | Intrinsic<br>Value |
|---|----------------------|---------------------------|---------------------|--------------------|
| Outstanding at December 31, 2014                | 2,188,051            | 12.52                     |                     |                    |
| Granted   | 209,542              | 12.40                     |                     |                    |
| Exercised                                       | (67,073)             | 6.02                      |                     |                    |
| Forfeited or expired                            | (430,200)            | 18.85                     |                     |                    |
| Outstanding at December 31, 2015                | 1,900,320            | \$ 11.30                  | 5.50                | \$ 4,653           |
| Exercisable at December 31, 2015                | 1,424,485            | \$ 15.08                  | 4.57                | \$ 3,816           |
| Vested or expected to vest at December 31, 2015 | 1,787,034            | \$ 11.40                  | 5.40                | \$ 4,352           |

We calculated the aggregate intrinsic value in the table above by taking the total pretax difference between our common stock's closing market value per share on the last trading day of the year and the stock option exercise price for each grant and multiplying that result by the number of shares that would have been received by the option holders had they exercised all their in-the-money stock options.

Information related to stock options exercised follows:

|   | 2015                   | 2014   | 2013   |
|---|------------------------|--------|--------|
|   | (Dollars in thousands) |        |        |
| Proceeds from the exercise of stock options           | \$ 404                 | \$ 684 | \$ 666 |
| Intrinsic value of stock options exercised            | 457                    | 1,129  | 859    |
| Income tax benefit related to stock options exercised | 160                    | 395    | 301    |

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## Stock-Based Compensation Expense Information

A summary of amounts recorded and to be recorded for stock-based compensation related to stock options follows:

|  | 2015                   | 2014     | 2013     |
|--|------------------------|----------|----------|
|  | (Dollars in thousands) |          |          |
| Compensation expense recorded in Selling, general and administrative expenses        | \$ 1,736               | \$ 2,626 | \$ 1,679 |
| Deferred income tax benefits related to compensation expense                         | 608                    | 919      | 588      |
| Total fair value of stock options vested   | 1,664                  | 2,545    | 2,228    |
| Unrecognized compensation cost   | 702                    | 779      | 1,282    |
| Expected weighted-average recognition period for unrecognized compensation, in years | 2.6                    | 2.2      | 0.9      |

## Performance Share Units

## General Information

Performance share units, expressed as shares of the Company's common stock, are earned only if the Company meets specific performance targets over a three-year period. The grants have a duration of three years.

The Plan allows for payout of up to 200% of the vesting-date fair value of the awards. We pay half of the earned value in cash and half in unrestricted shares of common stock. The portions of the grants that will be paid in cash are treated as liability awards, and therefore, we remeasure our liability and the related compensation expense at each balance sheet date, based on fair value. We treat the portions of the grants that will be settled with common stock as equity awards, and therefore, the amount of stock-based compensation we record over the performance period is based on the fair value on the grant date. The compensation expense and number of shares expected to vest for all performance share units are adjusted for the achievement of the performance share units' performance conditions, based upon our best estimate using available information.

## Performance Share Unit Valuation Model and Method Information

The estimated fair value of performance share units granted in 2015, 2014 and 2013 are based on the closing price of the Company's stock on the date of issuance and recorded based on achievement of target performance metrics. As of December 31, 2015, we have 0.2 million, 0.2 million and 0.5 million performance shares outstanding associated with our 2015, 2014 and 2013 grants, respectively.

The weighted average grant date fair value of our performance share units was \$12.32 for shares granted in 2015, \$13.09 for shares granted in 2014 and \$5.69 for shares granted in 2013. All performance share units are initially expensed at target and are evaluated each reporting period for likelihood of achieving the performance criteria, and the expense is adjusted, as appropriate.





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## Performance Share Unit Activity Information

A summary of performance share unit activity follows:

|                                       | Number of<br>Units | Weighted-<br>Average<br>Remaining<br>Contractual<br>Term |
|---------------------------------------|--------------------|--|
| Outstanding at December 31, 2014      | 888,930            |  |
| Granted                               | 235,890            |  |
| Exercised                             | (230,400)          |  |
| Forfeited or expired                  | (5,200)            |  |
| Outstanding at December 31, 2015      | 889,220            | 1.5  |
| Expected to vest at December 31, 2015 | 889,220            | 1.5  |

## Performance Share Expense Information

A summary of amounts recorded and to be recorded for stock-based compensation related to performance share units follows:

|  | 2015                   | 2014     | 2013     |
|--|------------------------|----------|----------|
|  | (Dollars in thousands) |          |          |
| Compensation expense recorded in Selling, general and administrative expenses        | \$ 4,669               | \$ 3,520 | \$ 3,277 |
| Deferred income tax benefits related to compensation expense                         | 1,634                  | 1,232    | 1,147    |
| Unrecognized compensation cost   | 2,858                  | 3,390    | 4,681    |
| Expected weighted-average recognition period for unrecognized compensation, in years | 1.5                    | 2.2      | 1.7      |

## Restricted Share Units

In 2015 and 2014, 0.2 million restricted share units were granted, and fair value is determined based on the closing price of the Company's stock on the date of issuance. Restricted share units are expressed as equivalent shares of the Company's common stock, and have a three year vesting period. Total expense included in Selling general and administrative expense related to restricted share units granted in 2015 was \$1.7 million and total unrecognized compensation cost was \$2.9 million. Total expense included in Selling general and administrative expense related to

restricted share units granted in 2014 was \$0.4 million and total unrecognized compensation cost was \$2.3 million.

#### Directors' Deferred Compensation

Separate from the Plan, the Company has established the Ferro Corporation Deferred Compensation Plan for Non-employee Directors, permitting its non-employee directors to voluntarily defer all or a portion of their compensation. The voluntarily deferred amounts are placed in individual accounts in a benefit trust known as a "rabbi trust" and invested in the Company's common stock with dividends reinvested in additional shares. All disbursements from the trust are made in the Company's common stock. The stock held in the rabbi trust is classified as treasury stock in shareholders' equity and the deferred compensation obligation that is required to be settled in shares of the Company's common stock, is classified as paid-in capital. The rabbi trust held 0.3 million shares, valued at \$3.2 million, at December 31, 2015, and 0.3 million shares, valued at \$3.4 million, at December 31, 2014.

#### 14. Restructuring and Cost Reduction Programs

Our restructuring and cost reduction programs have been developed with the objectives of leveraging our global scale, realigning and lowering our cost structure and optimizing capacity utilization. Total charges resulting from these activities were \$9.5 million in

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2015, \$8.8 million in 2014, and \$31.3 million in 2013, which is reported as Restructuring and impairment charges in our consolidated statement of operations. Descriptions of these restructuring programs follow:

## Global Cost Reduction Program

In 2013, we initiated a Global Cost Reduction Program that was designed to address 3 key areas of the company - (1) business realignment, (2) operational efficiency and (3) corporate and back office functions. Business realignment was targeted at right-sizing our commercial management organizations globally. The operational efficiency component of the program was designed to improve the efficiency of our plant operations and supply chain. The corporate and back office initiative is principally comprised of work that we are doing with our strategic partners in the areas of finance and accounting and information technology outsourcing, and procurement.

## Performance Coatings Restructuring Program

In 2012, we developed and initiated restructuring programs related to our Performance Coatings business in Europe. As a result of these programs, the Company eliminated positions within the Performance Coatings sales, technical service, product development, manufacturing, supply chain and general administration organizations throughout Europe. The programs were subject to required consultations with employee representatives at the affected sites and other local legal requirements. This program was completed in 2013.

We have summarized the charges associated with these restructuring programs by major type of charges below:

|  | Employee<br>Severance | Other<br>Costs | Total      |
|--|-----------------------|----------------|------------|
| (Dollars in thousands)                     |                       |                |            |
| Expected restructuring charges:            |                       |                |            |
| Performance Coatings restructuring         | 4,062                 | —              | 4,062      |
| Global Cost Reduction Program              | 28,504                | 21,123         | 49,627     |
| Other restructuring programs               | 1,252                 | 4,940          | 6,192      |
| Total expected restructuring charges       | \$ 33,818             | \$ 26,063      | \$ 59,881  |
| Restructuring charges incurred:            |                       |                |            |
| Performance Coatings restructuring         | \$ (1,639)            | \$ —           | \$ (1,639) |
| Global Cost Reduction Program              | 21,745                | 9,499          | 31,244     |
| Other restructuring programs               | —                     | 1,726          | 1,726      |
| Charges incurred in 2013                   | \$ 20,106             | \$ 11,225      | \$ 31,331  |
| Global Cost Reduction Program              | 2,744                 | 6,105          | 8,849      |
| Charges incurred in 2014                   | \$ 2,744              | \$ 6,105       | \$ 8,849   |
| Global Cost Reduction Program              | 4,015                 | 5,519          | 9,534      |
| Charges incurred in 2015                   | \$ 4,015              | \$ 5,519       | \$ 9,534   |
| Cumulative restructuring charges incurred: |                       |                |            |
| Performance Coatings restructuring         | \$ 4,062              | \$ —           | \$ 4,062   |

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|   |           |           |           |
|---|-----------|-----------|-----------|
| Global Cost Reduction Program                                     | 28,504    | 21,123    | 49,627    |
| Other restructuring programs                                      | 1,252     | 4,940     | 6,192     |
| Cumulative restructuring charges incurred as of December 31, 2015 | \$ 33,818 | \$ 26,063 | \$ 59,881 |

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We have summarized the charges associated with the restructuring programs by segments below:

|                                 | Total<br>Expected<br>Charges | 2015     | 2014     | 2013      | Cumulative<br>Charges To<br>Date |
|---------------------------------|------------------------------|----------|----------|-----------|----------------------------------|
|                                 | (Dollars in thousands)       |          |          |           |                                  |
| Performance Coatings            | \$ 4,460                     | \$ 204   | \$ 527   | \$ 1,542  | \$ 4,460                         |
| Performance Colors and Glass    | 20,252                       | 2,300    | 1,279    | 16,673    | 20,252                           |
| Pigments, Powders and Oxides    | 6,619                        | 1,970    | 80       | 589       | 6,619                            |
| Segment Total                   | 31,331                       | 4,474    | 1,886    | 18,804    | 31,331                           |
| Corporate Restructuring Charges | 28,550                       | 5,060    | 6,963    | 12,527    | 28,550                           |
| Total Restructuring Charges     | \$ 59,881                    | \$ 9,534 | \$ 8,849 | \$ 31,331 | \$ 59,881                        |

We have summarized the activities and accruals related to our restructuring and cost reduction programs below:

|                              | Employee<br>Severance  | Other Costs | Total     |
|------------------------------|------------------------|-------------|-----------|
|                              | (Dollars in thousands) |             |           |
| Balance at December 31, 2012 | \$ 4,093               | \$ 6,139    | \$ 10,232 |
| Restructuring charges        | 20,106                 | 11,225      | 31,331    |
| Cash payments                | (18,226)               | (11,607)    | (29,833)  |
| Non-cash items               | 210                    | (1,178)     | (968)     |
| Balance at December 31, 2013 | \$ 6,183               | \$ 4,579    | \$ 10,762 |
| Restructuring charges        | \$ 2,744               | \$ 6,105    | \$ 8,849  |
| Cash payments                | (8,337)                | (9,669)     | (18,006)  |
| Non-cash items               | (71)                   | (78)        | (149)     |
| Balance at December 31, 2014 | \$ 519                 | \$ 937      | \$ 1,456  |
| Restructuring charges        | \$ 4,015               | \$ 5,519    | \$ 9,534  |
| Cash payments                | (3,832)                | (4,341)     | (8,173)   |
| Non-cash items               | (9)                    | (38)        | (47)      |
| Balance at December 31, 2015 | \$ 693                 | \$ 2,077    | \$ 2,770  |

We expect to make cash payments to settle the remaining liability for employee severance benefits and other costs primarily over the next twelve months, except where legal or contractual restrictions prevent us from doing so.

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## 15. Leases

Rent expense for all operating leases was \$9.1 million in 2015, \$13.4 million in 2014, and \$15.9 million in 2013.

The Company has a number of capital lease arrangements primarily relating to buildings and production equipment. Assets held under capital leases and included in property, plant and equipment at December 31 follow:

|                                 | 2015                   | 2014     |
|---------------------------------|------------------------|----------|
|                                 | (Dollars in thousands) |          |
| Gross amounts capitalized       |                        |          |
| Buildings                       | \$ 3,100               | \$ 3,100 |
| Equipment                       | 4,086                  | 5,627    |
|                                 | 7,186                  | 8,727    |
| Accumulated amortization        |                        |          |
| Buildings                       | (3,100)                | (3,100)  |
| Equipment                       | (1,595)                | (3,030)  |
|                                 | (4,695)                | (6,130)  |
| Net assets under capital leases | \$ 2,491               | \$ 2,597 |

At December 31, 2015, future minimum lease payments under all non-cancelable leases are as follows:

|   | Capital<br>Leases      | Operating<br>Leases |
|---|------------------------|---------------------|
|   | (Dollars in thousands) |                     |
| 2016  | \$ 993                 | \$ 8,807            |
| 2017  | 980                    | 6,790               |
| 2018  | 915                    | 5,806               |
| 2019  | 767                    | 5,220               |
| 2020  | 492                    | 4,180               |
| Thereafter  | 1,812                  | 6,657               |
| Net minimum lease payments                                    | \$ 5,959               | \$ 37,460           |
| Less amount representing imputed interest and executory costs | 1,481                  |                     |

|   |          |
|---|----------|
| Present value of net minimum lease payments | 4,478    |
| Less current portion                        | 691      |
| Long-term obligations at December 31, 2015  | \$ 3,787 |

## 16. Miscellaneous Expense (Income), Net

Components of Miscellaneous expense (income), net follow:

|   | 2015                   | 2014       | 2013        |
|---|------------------------|------------|-------------|
|   | (Dollars in thousands) |            |             |
| Loss (gain) on sale of assets             | \$ 57                  | \$ (2,470) | \$ (24,075) |
| Argentina export tax matter               | 1,070                  | 515        | 8,334       |
| Other, net                                | (79)                   | 2,577      | (545)       |
| Total Miscellaneous expense (income), net | \$ 1,048               | \$ 622     | \$ (16,286) |

In the fourth quarter of 2013, the Supreme Court in Argentina ruled unfavorably related to certain export taxes associated with a divested operation. As a result of this ruling, we recorded a \$1.1 million charge in 2015, \$0.5 million charge in 2014 and \$8.3 million charge in 2013 related to the exposures.

In the first quarter of 2013, we sold assets associated with our solar pastes product line. The assets sold included, among other things, certain machinery and equipment, and inventory items related to open orders as well as intellectual property. The sale resulted in a gain of \$9.0 million. In the fourth quarter of 2013, we sold assets related to our North American and Asian metal powders product line for a gain of \$13.3 million. The transaction included the sale of manufacturing assets at our South Plainfield, New Jersey facility.



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Consideration received in the sale included a favorable supply agreement for materials to be used in our ongoing operations. As the supply agreement represents significant continuing involvement with the disposed operations, the transaction did not qualify as a discontinued operation.

## 17. Earnings (Loss) per Share

Details of the calculations of basic and diluted earnings (loss) per share follow:

|  | 2015   | 2014       | 2013      |
|--|--|------------|-----------|
|  | (Dollars in thousands, except per share amounts) |            |           |
| Basic earnings (loss) per share computation:   |  |            |           |
| Net income attributable to Ferro Corporation common shareholders   | \$ 64,100  | \$ 86,071  | \$ 71,942 |
| Adjustment for loss (income) from discontinued operations  | 36,779   | (94,840)   | (8,540)   |
| Total  | \$ 100,879                                       | \$ (8,769) | \$ 63,402 |
| Weighted-average common shares outstanding   | 86,718   | 86,920     | 86,484    |
| Basic earnings (loss) per share from continuing operations attributable to Ferro Corporation common shareholders   | \$ 1.16  | \$ (0.10)  | \$ 0.73   |
| Diluted earnings (loss) per share computation:   |  |            |           |
| Net income attributable to Ferro Corporation common shareholders   | \$ 64,100  | \$ 86,071  | \$ 71,942 |
| Adjustment for loss (income) from discontinued operations  | 36,779   | (94,840)   | (8,540)   |
| Total  | \$ 100,879                                       | \$ (8,769) | \$ 63,402 |
| Weighted-average common shares outstanding   | 86,718   | 86,920     | 86,484    |
| Assumed exercise of stock options  | 432  | —          | 309       |
| Assumed satisfaction of deferred stock unit conditions   | —  | —          | 189       |
| Assumed satisfaction of restricted stock unit conditions   | 338  | —          | 132       |
| Assumed satisfaction of performance stock unit conditions  | 945  | —          | 383       |
| Weighted-average diluted shares outstanding  | 88,433   | 86,920     | 87,497    |
| Diluted earnings (loss) per share from continuing operations attributable to Ferro Corporation common shareholders | \$ 1.14  | \$ (0.10)  | \$ 0.72   |

The number of anti-dilutive or unearned shares, was 1.8 million, 1.4 million, and 1.7 million common shares for 2015, 2014, and 2013, respectively. These shares were excluded from the calculation of diluted earnings per share due to their anti-dilutive impact.

## 18. Share Repurchase Program

On July 29, 2015, the Company's Board of Directors approved a share repurchase program, authorizing the Company to repurchase up to \$25 million of the Company's outstanding shares of common stock on the open market, including through a Rule 10b5-1 plan, or in privately negotiated transactions. On October 16, 2015, the Company's Board of Directors approved a follow-on share repurchase program, authorizing the Company to repurchase an additional \$25 million of the Company's outstanding shares of common stock.

The timing and amount of shares will be determined by the Company, based on evaluation of market and business conditions, share price, and other factors. The share repurchase program does not obligate the Company to repurchase any dollar amount or number of common shares, and may be suspended or discontinued at any time.

The Company repurchased 3,282,908 shares of common stock during 2015, at an average price of \$11.75 per share for a total cost of \$38.6 million.

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## 19. Accumulated Other Comprehensive Income (Loss)

Changes in Accumulated other comprehensive income (loss) by component, net of income tax, were as follows:

|   | Postretirement<br>Benefit<br>Liability<br>Adjustment | Translation<br>Adjustments | Other<br>Adjustments | Total       |
|---|--|----------------------------|----------------------|-------------|
|   | (Dollars in thousands)                               |                            |                      |             |
| Balance at December 31, 2012  | \$ 2,647   | \$ 14,080                  | \$ (77)              | \$ 16,650   |
| Other comprehensive income (loss) before reclassifications              | (274)  | (7,459)                    | —                    | (7,733)     |
| Amounts reclassified from accumulated other comprehensive income (loss) | (431)  |                            | 7                    | (424)       |
| Net current period other comprehensive income (loss)                    | (705)  | (7,459)                    | 7                    | (8,157)     |
| Balance at December 31, 2013  | 1,942  | 6,621                      | (70)                 | 8,493       |
| Other comprehensive income (loss) before reclassifications              | —  | (29,244)                   | —                    | (29,244)    |
| Amounts reclassified from accumulated other comprehensive income (loss) | (1,054)  | —                          | —                    | (1,054)     |
| Net current period other comprehensive income (loss)                    | (1,054)  | (29,244)                   | —                    | (30,298)    |
| Balance at December 31, 2014  | 888  | (22,623)                   | (70)                 | (21,805)    |
| Other comprehensive income (loss) before reclassifications              | —  | (39,436)                   | —                    | (39,436)    |
| Amounts reclassified from accumulated other comprehensive income (loss) | (77)   | —                          | —                    | (77)        |
| Net current period other comprehensive income (loss)                    | (77)   | (39,436)                   | —                    | (39,513)    |
| Balance at December 31, 2015  | \$ 811   | \$ (62,059)                | \$ (70)              | \$ (61,318) |

## 20. Reporting for Segments

During 2013, the Company reorganized its operating segments to reflect the current structure under which performance is evaluated, strategic decisions are made and resources are allocated. As discussed in Note 3, substantially all of the assets and liabilities of the Polymer Additives and the Specialty Plastics reportable segments were sold during 2014 and included in discontinued operations in the consolidated statement of operations for all years presented. The retained assets and operations of the Specialty Plastics reportable segment, which includes the manufacturing facilities in Edison, New Jersey, and Venezuela, are reflected within our Pigments, Powders and Oxides and Performance Coatings reportable segments, respectively. All periods presented reflect these changes to the composition of our reportable segments. As discussed in Note 4, the acquisitions of Al Salomi and Nubiola occurred in 2015 and the acquisition of Vetriceramici occurred in 2014. All of the operations for Nubiola are included in the Pigments, Powders and Oxides reportable segment and all operations for Al Salomi and Vetriceramici are included in the Performance Coatings reportable segment except for the Vetriceramici glass product line that is included in the Performance Colors and Glass reportable segment. The Company's reportable segments for 2015 include Performance Coatings, Performance Colors and Glass, and Pigments, Powders and Oxides.

Net sales to external customers by segment are presented in the table below. Sales between segments were not material.

|                              | 2015                   | 2014         | 2013         |
|------------------------------|------------------------|--------------|--------------|
|                              | (Dollars in thousands) |              |              |
| Performance Coatings         | \$ 533,370             | \$ 588,538   | \$ 600,361   |
| Performance Colors and Glass | 376,769                | 407,674      | 390,007      |
| Pigments, Powders and Oxides | 165,202                | 115,414      | 198,214      |
| Total net sales              | \$ 1,075,341           | \$ 1,111,626 | \$ 1,188,582 |

Segment gross profit is the metric utilized by management to evaluate segment performance. We measure segment gross profit for internal reporting purposes by excluding certain other cost of sales, which includes costs associated with facilities that have been idled or closed, certain other costs not directly attributable to business units, and pension and other postretirement benefits mark-to-

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market adjustments. Assets by segment are not regularly reviewed by the chief operating decision maker. Each segment's gross profit and reconciliations to Income (loss) before income taxes are presented in the table below:

|  | 2015                   | 2014        | 2013       |
|--|------------------------|-------------|------------|
|  | (Dollars in thousands) |             |            |
| Performance Coatings                         | \$ 126,945             | \$ 131,043  | \$ 134,138 |
| Performance Colors and Glass                 | 128,209                | 134,964     | 112,825    |
| Pigments, Powders and Oxides                 | 45,678                 | 28,480      | 36,235     |
| Other cost of sales                          | 848                    | (9,402)     | (5,526)    |
| Total gross profit                           | 301,680                | 285,085     | 277,672    |
| Selling, general and administrative expenses | 216,899                | 286,762     | 150,753    |
| Restructuring and impairment charges         | 9,655                  | 8,849       | 40,929     |
| Other expense, net                           | 20,343                 | 32,310      | 7,800      |
| Income (loss) before income taxes            | \$ 54,783              | \$ (42,836) | \$ 78,190  |

Each segment's capital expenditures for long-lived assets are detailed below:

|  | 2015                   | 2014      | 2013      |
|--|------------------------|-----------|-----------|
|  | (Dollars in thousands) |           |           |
| Performance Coatings                                     | \$ 8,148               | \$ 6,546  | \$ 7,949  |
| Performance Colors and Glass                             | 6,620                  | 4,216     | 7,970     |
| Pigments, Powders and Oxides                             | 2,412                  | 453       | 2,035     |
| Total segment expenditures for long-lived assets         | 17,180                 | 11,215    | 17,954    |
| Unallocated corporate expenditures for long-lived assets | 3,142                  | 12,127    | 4,361     |
| Total expenditures for long lived assets (1)             | \$ 20,322              | \$ 23,342 | \$ 22,315 |

(1) Excludes capital expenditures of discontinued operations of \$22.7 million, \$30.5 million and \$11.9 million in 2015, 2014 and 2013, respectively.

We sell our products throughout the world and we attribute sales to countries based on the country where we generate the customer invoice. No single country other than the U.S., Spain, and Germany represent greater than 10% of our net sales. Net sales by geographic region are as follows:

|                     | 2015                   | 2014         | 2013         |
|---------------------|------------------------|--------------|--------------|
|                     | (Dollars in thousands) |              |              |
| United States       | \$ 281,976             | \$ 263,452   | \$ 318,631   |
| Spain               | 174,742                | 211,449      | 225,264      |
| Germany             | 114,757                | 125,405      | 133,411      |
| Other international | 503,866                | 511,320      | 511,276      |
| Total net sales     | \$ 1,075,341           | \$ 1,111,626 | \$ 1,188,582 |

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None of our operations in countries other than Spain, U.S., Colombia, Germany, and China owns greater than 10% of consolidated long-lived assets. Long-lived assets that consist of property, plant, and equipment by geographic region at December 31 are as follows:

|                         | 2015                   | 2014       |
|-------------------------|------------------------|------------|
|                         | (Dollars in thousands) |            |
| Spain                   | \$ 58,657              | \$ 53,083  |
| United States           | 38,466                 | 41,669     |
| Colombia                | 31,595                 | —          |
| Germany                 | 24,890                 | 27,281     |
| China                   | 18,349                 | 21,818     |
| Other international     | 88,472                 | 68,791     |
| Total long-lived assets | \$ 260,429             | \$ 212,642 |

## 21. Unconsolidated Affiliates Accounted For Under the Equity Method

At December 31, 2015, our percentage of ownership interest in these affiliates ranged from 34% to 50%. Because we exert significant influence over these affiliates, but we do not control them, our investments have been accounted for under the equity method. Investment income from these equity method investments, which is reported in Miscellaneous expense (income), net was \$0.8 million in 2015, \$0.8 million in 2014, and \$0.1 million in 2013. The balance of our equity method investments, which is reported in Other non-current assets, was \$16.0 million at December 31, 2015, and \$17.9 million at December 31, 2014.

The income that we record for these investments is equal to our proportionate share of the affiliates' income and our investments are equal to our proportionate share of the affiliates' shareholders' equity based on our ownership percentage. We have summarized below condensed income statement and balance sheet information for the combined equity method investees:

|                                   | 2015                   | 2014      | 2013      |
|-----------------------------------|------------------------|-----------|-----------|
|                                   | (Dollars in thousands) |           |           |
| Net sales                         | \$ 47,443              | \$ 54,469 | \$ 62,419 |
| Gross profit                      | 4,799                  | 4,896     | 4,572     |
| Income from continuing operations | 1,887                  | 254       | 1,859     |
| Net income                        | 1,292                  | 133       | 1,266     |

|                         | 2015                   | 2014      |
|-------------------------|------------------------|-----------|
|                         | (Dollars in thousands) |           |
| Current assets          | \$ 40,499              | \$ 42,613 |
| Non-current assets      | 27,252                 | 24,511    |
| Current liabilities     | (15,893)               | (17,663)  |
| Non-current liabilities | (14,678)               | (9,662)   |

We had the following transactions with our equity-method investees:

|                                   | 2015                   | 2014     | 2013     |
|-----------------------------------|------------------------|----------|----------|
|                                   | (Dollars in thousands) |          |          |
| Sales                             | \$ 6,740               | \$ 5,255 | \$ 5,347 |
| Purchases                         | 3,485                  | 7,632    | 9,342    |
| Dividends and interest received   | 332                    | 172      | 426      |
| Commission and royalties received | 197                    | 462      | 400      |
| Commissions and royalties paid    | 165                    | 34       | 37       |



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## 22. Quarterly Data (Unaudited)

|   | Net Sales    | Gross Profit | Net Income (Loss) | Net Income (Loss) Attributable to Ferro Corporation | Earnings (Loss) Attributable to Common Shareholders Per Common Share | Basic   | Diluted |
|---|--------------|--------------|-------------------|---|--|---------|---------|
| (Dollars in thousands, except per share data) |              |              |                   |   |  |         |         |
| 2014  |              |              |                   |   |  |         |         |
| Quarter 1                                     | \$ 280,727   | \$ 74,953    | \$ 16,732         | \$ 17,204   | \$ 0.20  | \$ 0.20 |         |
| Quarter 2                                     | 294,217      | 78,454       | 10,388            | 9,959   | 0.11   | 0.11    |         |
| Quarter 3                                     | 275,754      | 72,804       | 47,557            | 47,465  | 0.55   | 0.55    |         |
| Quarter 4                                     | 260,928      | 58,874       | 11,554            | 11,443  | 0.13   | 0.13    |         |
| Total   | \$ 1,111,626 | \$ 285,085   | \$ 86,231         | \$ 86,071   | \$ 0.99  | \$ 0.99 |         |
| 2015  |              |              |                   |   |  |         |         |
| Quarter 1                                     | \$ 262,772   | \$ 70,635    | \$ 9,015          | \$ 10,970   | \$ 0.12  | \$ 0.13 |         |
| Quarter 2                                     | 268,214      | 77,640       | 6,785             | 6,599   | 0.08   | 0.08    |         |
| Quarter 3                                     | 279,365      | 77,028       | (3,561)           | (4,059)   | (0.05)   | (0.05)  |         |
| Quarter 4                                     | 264,990      | 76,377       | 50,865            | 50,590  | 0.59   | 0.58    |         |
| Total   | \$ 1,075,341 | \$ 301,680   | \$ 63,104         | \$ 64,100   | \$ 0.74  | \$ 0.72 |         |

Quarterly earnings per share amounts do not always add to the full-year amounts due to the averaging of shares.

Restructuring and impairment charges in 2015 were \$0.5 million in the first quarter, \$1.1 million in the second quarter, \$3.8 million in the third quarter, and \$4.3 million in the fourth quarter. Restructuring and impairment charges in 2014 were \$4.3 million in the first quarter, \$2.0 million in the second quarter, \$1.5 million in the third quarter, and \$1.0 million in the fourth quarter. Mark-to-market net losses on our postretirement benefit plans were \$20.8 million in the fourth quarter of 2015 and mark-to-market net losses on our postretirement benefit plans were \$89.6 million in the fourth quarter of 2014.

## 23. Subsequent Events

In January 2016, the Company completed the purchase of 100% of the equity of privately held Istanbul-based Ferer Dis Ticaret Ve Kimyasallar Anonim Sirketi A.S. ("Ferer") on a cash-free and debt-free basis for approximately \$8.5 million in cash, subject to customary working capital and other adjustments.

In January 2016, the Company amended its Credit Facility by entering into the Incremental Assumption Agreement, (the “Incremental Agreement”) with a group of lenders which increases the revolving line of credit amount from \$200,000,000 to \$300,000,000.

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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

Ferro is committed to maintaining disclosure controls and procedures that are designed to ensure that information required to be disclosed in its Exchange Act reports is recorded, processed, summarized, and reported within the time periods specified in the U.S. Securities and Exchange Commission's rules and forms, and that such information is accumulated and communicated to its management, including its Chief Executive Officer and Chief Financial Officer, as appropriate to allow timely decisions regarding required disclosure.

The Company's management, under the supervision and with the participation of the Chief Executive Officer and the Chief Financial Officer, evaluated the effectiveness of the design and operation of the Company's disclosure controls and procedures, as defined in Exchange Act Rule 13a-15(e), as of December 31, 2015. The Company's disclosure controls and procedures include components of the Company's internal control over financial reporting. Based on that evaluation, management concluded that the disclosure controls and procedures were effective as of December 31, 2015. Management has excluded from its assessment of the effectiveness of the Company's internal control over financial reporting at Corporación Química Vhem, S.L., Dibon USA, LLC and Ivory Corporation, S.A. (together with their direct and indirect subsidiaries, "Nubiola"), which was acquired on July 7, 2015 and Al Salomi for Frits and Glazes ("Al Salomi"), which was acquired on November 17, 2015, whose financial statements constitute 20.8% of the Company's total assets, 5.5% of total net sales, and 0.3% of total net income of the consolidated financial statement amounts as of and for the year ended December 31, 2015.

Changes in Internal Control over Financial Reporting and Other Remediation

During the fourth quarter of 2015, there were no changes in our internal controls or in other factors that materially affected, or are reasonably likely to materially affect, our internal controls over financial reporting.

Management's Annual Report on Internal Control over Financial Reporting

The Company's management is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Exchange Act Rule 13a-15(f). The Company's internal control system is a process designed by, or under the supervision of, the Company's principal executive and principal financial officers, or persons performing similar functions, and effected by the Company's board of directors, management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with U.S. generally accepted accounting principles ("U.S. GAAP").

The Company's internal control over financial reporting includes policies and procedures that pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect transactions and dispositions of assets; provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with U.S. GAAP, and that receipts and expenditures are being made only in accordance with the authorization of its management and directors; and 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 its consolidated 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 risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Management assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2015. In making this assessment, the Company used the control criteria framework of the Committee of Sponsoring Organizations of the Treadway Commission published in its report entitled Internal Control - Integrated Framework (2013). Management concluded that the Company's internal control over financial reporting was effective as of December 31, 2015.

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Deloitte & Touche LLP, the independent registered public accounting firm that audited the Company's consolidated financial statements, has issued an attestation report on the Company's internal control over financial reporting as of December 31, 2015, which is included below.

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Shareholders of Ferro Corporation

Cleveland, Ohio

We have audited the internal control over financial reporting of Ferro Corporation and subsidiaries (the “Company”) as of December 31, 2015, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission.

As described in Management’s Annual Report on Internal Control over Financial Reporting, management has excluded from its assessment of the effectiveness of the Company’s internal control over financial reporting at Corporación Química Vhem, S.L., Dibon USA, LLC and Ivory Corporation, S.A. (together with their direct and indirect subsidiaries, “Nubiola”), which was acquired on July 7, 2015, and Al Salomi for Frits and Glazes (“Al Salomi”), which was acquired on November 17, 2015, whose financial statements constitute 20.8% of the Company’s total assets, 5.5% of total net sales, and 0.3% of total net income of the consolidated financial statement amounts as of and for the year ended December 31, 2015. Accordingly, our audit did not include the internal control over financial reporting at Nubiola and Al Salomi. The Company’s management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management’s Annual Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company’s internal control over financial reporting based on our audit.

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Annual Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit.

We conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

A company's internal control over financial reporting is a process designed by, or under the supervision of, the company's principal executive and principal financial officers, or persons performing similar functions, and effected by the company's board of directors, management, and other personnel 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 (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) 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 (3) 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 the inherent limitations of internal control over financial reporting, including the possibility of collusion or improper management override of controls, material misstatements due to error or fraud may not be prevented or detected on a timely basis. Also, projections of any evaluation of the effectiveness of the internal control over financial reporting to future periods are subject to the risk that the controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2015, based on the criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission.

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We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the consolidated financial statements and financial statement schedule as of and for the year ended December 31, 2015, of the Company and our report dated February 24, 2016, expressed an unqualified opinion on those financial statements and financial statement schedule.

/s/ Deloitte & Touche LLP

Cleveland, Ohio

February 24, 2016

Item 9B — Other Information

None.

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PART III

Item 10 — Directors, Executive Officers and Corporate Governance

The information on Ferro’s directors is contained under the heading “Election of Directors” of the Proxy Statement for Ferro Corporation’s 2016 Annual Meeting of Shareholders and is incorporated here by reference. The information about the Audit Committee and the Audit Committee financial expert is contained under the heading “Corporate Governance — Board Committees — Audit Committee” of the Proxy Statement for Ferro Corporation’s 2016 Annual Meeting of Shareholders and is incorporated here by reference. Information on Ferro’s executive officers is contained under the heading “Executive Officers of the Registrant” in Part 1 of this Annual Report on Form 10-K. Section 16(a) filing information is contained under the heading “Shareholdings — Section 16(a) Beneficial Ownership Reporting Compliance” of the Proxy Statement for Ferro Corporation’s 2016 Annual Meeting of Shareholders and is incorporated here by reference.

Ferro has adopted a series of policies dealing with business and ethics. These policies apply to all Ferro Directors, officers and employees. A summary of these policies may be found on Ferro’s Web site and the full text of the policies is available in print, free of charge, by writing to: General Counsel, Ferro Corporation, 6060 Parkland Blvd. Suite 250, Mayfield Heights, Ohio, 44124, USA. Exceptions, waivers and amendments of those policies may be made, if at all, only by the Audit Committee of the Board of Directors, and, in the event any such exceptions, waivers or amendments are granted, a description of the change or event will be posted on Ferro’s Web site ([www.ferro.com](http://www.ferro.com)) within four business days. Ferro maintains a worldwide hotline that allows employees throughout the world to report confidentially any detected violations of these legal and ethical conduct policies consistent with local legal requirements and subject to local legal limitations.

Item 11 — Executive Compensation

The information on executive compensation is contained under the headings “Executive Compensation Discussion & Analysis” and “2015 Executive Compensation” of the Proxy Statement for Ferro Corporation’s 2016 Annual Meeting of Shareholders and is incorporated here by reference.

Item 12 — Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information on security ownership of certain beneficial owners and management is contained under the headings “Shareholdings — Stock Ownership by Other Major Shareholders” and “Shareholdings — Stock Ownership by Director, Executive

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Officers and Employees” of the Proxy Statement for Ferro Corporation’s 2016 Annual Meeting of Shareholders and is incorporated here by reference.

The numbers of shares issued and available for issuance under Ferro’s equity compensation plans as of December 31, 2015, were as follows:

|   | Number of Shares to Be Issued on Exercise of Outstanding Options, and Other Awards | Weighted-Average Exercise Price of Outstanding Options, and Other Awards | Number of Shares Remaining Available for Future Issuance Under Equity Compensation Plans(1) |
|---|--|--|---|
| Equity Compensation Plan Approved by Ferro Shareholders | 3,541,950  | (2) \$ 6.06  | 3,181,458   |
| Not Approved by Ferro Shareholders                      | 169,224  | —  | —   |
| Total   | 3,711,174  | \$ 6.06  | (4) 3,181,458   |

(1) Excludes shares listed in the second column.

(2) Includes options and other awards issued under the Company’s 2013 Omnibus Incentive Compensation Plan and prior equity compensation plans.

(3) Shares are only available under the 2013 Omnibus Incentive Plan and may be issued as stock options, stock appreciation rights, restricted shares or units, performance shares or units, and other common stock-based awards.

(4) Weighted-average exercise price of outstanding options and other awards; excludes phantom units.

A description follows of the material features of each plan that was not approved by Ferro shareholders:

- Executive Employee Deferred Compensation Plan. The Executive Employee Deferred Compensation Plan allows participants to defer up to 75% of annual base salary and up to 100% of incentive cash bonus awards and cash performance share payouts. Participants may elect to have all or a portion of their deferred compensation accounts deemed to be invested in shares of Ferro Common Stock and credited with hypothetical appreciation, depreciation, and dividends. When distributions are made from this Plan in respect of such shares, the distributions are made in actual shares of Ferro Common Stock.
- Supplemental Executive Defined Contribution Plan. The Supplemental Executive Defined Contribution Plan allows participants to be credited annually with matching and basic pension contributions that they would have received under the Company’s 401(k) plan except for the applicable IRS limitations on compensation and contributions. Contributions vest at 20% for each year of service, are deemed invested in Ferro Common Stock and earn dividends. Distributions are made in Ferro Common Stock or in cash.

#### Item 13 — Certain Relationships and Related Transactions, and Director Independence

There are no relationships or transactions that are required to be reported. The information about director independence is contained under the heading “Corporate Governance — Director Independence” of the Proxy Statement

for Ferro Corporation's 2016 Annual Meeting of Shareholders and is incorporated here by reference.

Item 14 — Principal Accountant Fees and Services

The information contained under the heading "Accounting Firm Information — Fees" of the Proxy Statement for Ferro Corporation's 2016 Annual Meeting of Shareholders is incorporated here by reference.

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PART IV

Item 15 — Exhibits and Financial Statement Schedules

The following documents are filed as part of this Annual Report on Form 10-K:

- (a) The consolidated financial statements of Ferro Corporation and subsidiaries contained in Part II, Item 8 of this Annual Report on Form 10-K:
  - Consolidated Statements of Operations for the years ended December 31, 2015, 2014 and 2013;
  - Consolidated Statements of Comprehensive (Loss) Income for the years ended December 31, 2015, 2014 and 2013;
  - Consolidated Balance Sheets at December 31, 2015 and 2014;
  - Consolidated Statements of Equity for the years ended December 31, 2015, 2014 and 2013;
  - Consolidated Statements of Cash Flows for the years ended December 31, 2015, 2014 and 2013; and
  - Notes to Consolidated Financial Statements
- (b) Schedule II — Valuation and Qualifying Accounts and Reserves for the years ended December 31, 2015, 2014 and 2013, contained on page 98 of this Annual Report on Form 10-K. All other schedules have been omitted because the material is not applicable or is not required as permitted by the rules and regulations of the U.S. Securities and Exchange Commission, or the required information is included in the consolidated financial statements.
- (c) The exhibits listed in the Exhibit Index beginning on page 99 of this Annual Report on Form 10-K.

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SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this Annual Report on Form 10-K to be signed on its behalf by the undersigned, thereunto duly authorized.

FERRO CORPORATION

By /s/ Peter T. Thomas  
Peter T. Thomas  
Chairman, President and Chief Executive Officer

Date: February 24, 2016

Pursuant to the requirements of the Securities Exchange Act of 1934, this Annual Report on Form 10-K has been signed below by the following persons on behalf of the Registrant and in their indicated capacities as of the 24th day of February, 2016.

/s/ Peter T. Thomas            Chairman, President and Chief Executive Officer  
Peter T. Thomas            (Principal Executive Officer)

/s/ Jeffrey L. Rutherford    Vice President and Chief Financial Officer  
Jeffrey L. Rutherford    (Principal Financial and Accounting Officer)

/s/ Richard J. Hipple        Director  
Richard J. Hipple

/s/ Jennie S. Hwang         Director  
Jennie S. Hwang

/s/ Gregory E. Hyland       Director  
Gregory E. Hyland

/s/ Peter T. Kong            Director  
Peter T. Kong

/s/ David A. Lorber          Director  
David A. Lorber

/s/ Timothy K. Pistell       Director  
Timothy K. Pistell

/s/ Jeffry N. Quinn      Director  
Jeffry N. Quinn

/s/ Ronald P. Vargo      Director  
Ronald P. Vargo

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## FERRO CORPORATION AND SUBSIDIARIES

## SCHEDULE II — VALUATION AND QUALIFYING ACCOUNTS AND RESERVES

Years Ended December 31, 2015, 2014 and 2013

|  | Balance at<br>Beginning<br>of<br>Period<br>(Dollars in thousands) | Additions<br>Charged<br>(Reductions<br>Credited)<br>to<br>Costs<br>and<br>Expenses | Deductions | Adjustment<br>for<br>Differences<br>in<br>Exchange<br>Rates | Balance at<br>End of<br>Period |
|--|---|--|------------|---|--------------------------------|
| Allowance for Possible Losses on Collection of<br>Accounts Receivable: |   |  |            |   |                                |
| Year ended December 31, 2015   | \$ 10,325   | 667  | (1,802)    | (1,406)   | \$ 7,784                       |
| Year ended December 31, 2014   | \$ 12,093   | 2,657  | (3,442)    | (983)   | \$ 10,325                      |
| Year ended December 31, 2013   | \$ 13,819   | 3,961  | (6,058)    | 371   | \$ 12,093                      |
| Valuation Allowance on Net Deferred Tax Assets:                        |   |  |            |   |                                |
| Year ended December 31, 2015   | \$ 147,887  | —  | (86,597)   | 1 (6,247)   | \$ 55,043                      |
| Year ended December 31, 2014   | \$ 193,984  | —  | (37,801)   | 1 (8,296)   | \$ 147,887                     |
| Year ended December 31, 2013   | \$ 216,882  | —  | (25,568)   | 2,670   | \$ 193,984                     |

(1) Included within this deduction is \$63.3 million and \$31.7 million for the year ended December 31, 2015 and 2014, respectively, of valuation allowance release, resulting from the conclusion that the underlying deferred tax assets are more likely than not to be realized.

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EXHIBIT INDEX

The following exhibits are filed with this report or are incorporated here by reference to a prior filing in accordance with Rule 12b-32 under the Securities and Exchange Act of 1934.

Exhibit:

- 2 Plan of acquisition, reorganization, arrangement or successor:
- 2.1 Sale and Purchase Agreement, dated April 29, 2015, by and among Ferro Corporation, the sellers party thereto, Corporación Química Vhem, S.L. and Dibon USA, LLC (incorporated by reference to Exhibit 2.1 to Ferro Corporation's Current Report on Form 8-K filed July 9, 2015).
- 2.2 Addendum to Sale and Purchase Agreement, dated July 7, 2015, by and among Ferro Corporation, Ferro Spain Management Company, S.L.U., the sellers party thereto, Corporación Química Vhem, S.L. and Dibon USA, LLC (incorporated by reference to Exhibit 2.2 to Ferro Corporation's Current Report on Form 8-K filed July 9, 2015).
- 3 Articles of Incorporation and by-laws:
- 3.1 Eleventh Amended Articles of Incorporation of Ferro Corporation (incorporated by reference to Exhibit 4.1 to Ferro Corporation's Registration Statement on Form S-3, filed March 5, 2008).
- 3.2 Certificate of Amendment to the Eleventh Amended Articles of Incorporation of Ferro Corporation filed December 29, 1994 (incorporated by reference to Exhibit 4.2 to Ferro Corporation's Registration Statement on Form S-3, filed March 5, 2008).
- 3.3 Certificate of Amendment to the Eleventh Amended Articles of Incorporation of Ferro Corporation filed June 23, 1998 (incorporated by reference to Exhibit 4.3 to Ferro Corporation's Registration Statement on Form S-3, filed March 5, 2008).
- 3.4 Certificate of Amendment to the Eleventh Amended Articles of Incorporation of Ferro Corporation filed October 14, 2011 (incorporated by reference to Exhibit 3.1 to Ferro Corporation's Current Report on Form 8-K, filed October 17, 2011).
- 3.5 Certificate of Amendment to the Eleventh Amended Articles of Incorporation of Ferro Corporation filed on April 25, 2014 (incorporated by reference to Exhibit 3.5 to Ferro Corporation's Quarterly Report on Form 10-Q for the quarter ended June 30, 2014).
- 3.6 Ferro Corporation Amended and Restated Code of Regulations (incorporated by reference to Exhibit 3.1 to Ferro Corporation's Current Report on Form 8-K filed April 28, 2015).
- 4 Instruments defining rights of security holders, including indentures:
- 4.1 Senior Indenture, dated as of March 5, 2008, by and between Ferro Corporation and U.S. Bank National Association (incorporated by reference to Exhibit 4.5 to Ferro Corporation's Registration Statement on Form S-3, filed March 5, 2008).
- 4.2 First Supplemental Indenture, dated August 19, 2008, by and between Ferro Corporation and U.S. Bank National Association (with Form of 6.50% Convertible Senior Notes due 2013) (incorporated by reference to Exhibit 4.2 to Ferro Corporation's Current Report on Form 8-K, filed August 19, 2008).
- 4.3 Form of Indenture, by and between Ferro Corporation and Wilmington Trust FSB (incorporated by reference to Exhibit 4.1 to Ferro Corporation's Registration Statement on Form S-3ASR, filed July 27, 2010).
- 4.4 First Supplemental Indenture, dated August 24, 2010, by and between Ferro Corporation and Wilmington Trust FSB (with Form of 7.875% Senior Notes due 2018) (incorporated by reference to Exhibit 4.1 to Ferro Corporation's Current Report on Form 8-K, filed August 24, 2010).



- 4.5 Second Supplemental Indenture, dated July 31, 2014, by and between Ferro Corporation and Wilmington Trust, National Association (incorporated by reference to Exhibit 4.1 to Ferro Corporation's Current Report on Form 8-K, filed August 5, 2014).

The Company agrees, upon request, to furnish to the U.S. Securities and Exchange Commission a copy of any instrument authorizing long-term debt that does not authorize debt in excess of 10% of the total assets of the Company and its subsidiaries on a consolidated basis.

10 Material Contracts:

- 10.1 Credit Agreement, dated as of July 31, 2014, among Ferro Corporation, the lenders party thereto, PNC Bank, National Association, as the administrative agent, collateral agent and a letter of credit issuer, JPMorgan Chase Bank N.A., as the syndication agent and as a letter of credit issuer, and the various financial institutions and other persons from time to time party hereto (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K, filed August 5, 2014).
- 10.2 Incremental Assumption Agreement, dated January 25, 2016, by and among Ferro Corporation, PNC Bank, National Association, as the administrative agent, the collateral agent and as an issuer, JPMorgan Chase Bank, N.A., as an issuer, and various financial institutions as lenders (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K filed January 26, 2016).

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- 10.3 Third Amendment to Third Amended and Restated Credit Agreement, dated March 28, 2013, by and among Ferro Corporation, certain of Ferro Corporation's subsidiaries, PNC Bank, National Association, as the Administrative Agent and the Collateral Agent, and various financial institutions as Lenders (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K, filed March 28, 2013).
- 10.4 Second Amendment to Third Amended and Restated Credit Agreement, dated June 15, 2012, by and among Ferro Corporation, certain of Ferro Corporation's subsidiaries, PNC Bank, National Association, as the Administrative Agent and the collateral Agent, and various financial institutions as Lenders (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K, filed June 19, 2012).
- 10.5 First Amendment to Third Amended and Restated Credit Agreement, Amended and Restated Pledge and Security Agreement and Amended and Restated Subsidiary Guaranty (Domestic) (incorporated by reference to Exhibit 3.1 to Ferro Corporation's Quarterly Report on Form 10-Q for the quarter ended June 30, 2011).
- 10.6 Third Amended and Restated Credit Agreement, dated August 24, 2010, by and among Ferro Corporation, PNC Bank, National Association, as the Administrative Agent, the Collateral Agent and the Issuer, and JPMorgan Chase Bank, N.A. and Bank of America, N.A., as the Syndication Agents (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K, filed August 24, 2010).
- 10.7 First Amendment to Second Amended and Restated Credit Agreement, dated July 26, 2010, by and among Ferro Corporation, the several banks and other financial institutions or entities listed on the signature pages hereto as Lenders, Credit Suisse AG, Cayman Islands Branch, as Original Term Loan Administrative Agent, and PNC Bank, National Association, as New Term Loan Administrative Agent and as Revolving Loan Administrative Agent (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K, filed July 27, 2010).
- 10.8 Second Amended and Restated Credit Agreement, dated October 26, 2009, among Ferro Corporation and certain of its subsidiaries; various financial institutions; Credit Suisse, Cayman Islands Branch; PNC Bank, National Association; National City Bank; KeyBank National Association; and Citigroup Global Markets, Inc. (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K, filed October 27, 2009).
- 10.9 Amendment and Restatement and Resignation and Appointment Agreement, dated October 26, 2009, among Ferro Corporation; the several banks and other financial institutions or entities listed on the signature pages thereto; Credit Suisse, Cayman Islands Branch,; National City Bank; and PNC Bank, National Association (incorporated by reference to Exhibit 10.2 to Ferro Corporation's Current Report on Form 8-K, filed October 27, 2009).
- 10.10 Second Amendment to Purchase and Contribution Agreement by and between Ferro Corporation and Ferro Finance Corporation (incorporated by reference to Exhibit 10.2 to Ferro Corporation's Current Report on Form 8-K, filed March 29, 2013).
- 10.11 First Amendment to Purchase and Contribution Agreement, dated as of May 31, 2011, between Ferro Corporation and Ferro Finance Corporation (incorporated by reference to Exhibit 10.2 to Ferro Corporation's Current Report on Form 8-K, filed June 3, 2011).
- 10.12 Purchase and Contribution Agreement, dated June 2, 2009, between Ferro Corporation and Ferro Finance Corporation (incorporated by reference to Exhibit 10.2 to Ferro Corporation's Current Report on Form 8-K, filed June 3, 2009).
- 10.13 Fourth Amendment to Amended and Restated Receivables Purchase Agreement, dated as of September 20, 2013, by and among PNC Bank, National Association, Ferro Finance Corporation and Market Street Funding LLC (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Quarter Report on Form 10-Q for the quarter ended September 30, 2013).
- 10.14 Third Amendment to Amended and Restated Receivables Purchase Agreement, dated as of May 28, 2013, among Ferro Finance Corporation, Ferro Corporation, Market Street Funding LLC and PNC Bank, National Association (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K,

- filed May 30, 2013).
- 10.15 Second Amendment to Amended and Restated Receivables Purchase Agreement among Ferro Finance Corporation, Ferro Corporation, Market Street Funding LLC and PNC Bank, National Association, as Agent and LC Bank (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K, filed March 29, 2013).
- 10.16 First Amendment to Amended and Restated Receivables Purchase Agreement, dated as of May 29, 2012, among Ferro Finance Corporation, Ferro Corporation, Market Street Funding, LLC, and PNC Bank, National Association (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K, filed May 31, 2012).
- 10.17 Amended and Restated Receivables Purchase Agreement, dated as of May 31, 2011, among Ferro Finance Corporation, Ferro Corporation, Market Street Funding, LLC, and PNC Bank, National Association (incorporated by reference to Exhibit 10.3 to Ferro Corporation's Current Report on Form 8-K, filed June 3, 2011).
- 10.18 Ferro Corporation Employee Stock Option Plan (incorporated by reference to Exhibit 10.13 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2011).\*
- 10.19 Ferro Corporation 2003 Long-Term Incentive Compensation Plan (incorporated by reference to Exhibit 10.16 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2008).\*
- 10.20 Form of Terms of Incentive Stock Option Award Grants under the Ferro Corporation 2003 Long-Term Incentive Compensation Plan (incorporated by reference to Exhibit 10.17 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2008).\*

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- 10.21 Form of Terms of Performance Share Awards under the Ferro Corporation 2003 Long-Term Incentive Compensation Plan (incorporated by reference to Exhibit 10.18 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2008).\*
- 10.22 Ferro Corporation 2006 Long-Term Incentive Plan (incorporated by reference to Exhibit 10.17 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2011).\*
- 10.23 Form of Terms of Performance Share Awards under the Ferro Corporation 2003 Long-Term Incentive Compensation Plan (incorporated by reference to Exhibit 10.18 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2008).\*
- 10.24 Form of Terms of Nonstatutory Stock Option Grants under the Ferro Corporation 2006 Long-Term Incentive Compensation Plan (incorporated by reference to Exhibit 10.21 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2008).\*
- 10.25 Form of Terms of Performance Share Awards under the Ferro Corporation 2006 Long-Term Incentive Compensation Plan (incorporated by reference to Exhibit 10.22 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2008).\*
- 10.26 Form of Terms of Restricted Share Awards under the Ferro Corporation 2006 Long-Term Incentive Compensation Plan (incorporated by reference to Exhibit 10.23 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2008).\*
- 10.27 Form of Terms of Deferred Stock Unit Awards under the Ferro Corporation 2013 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Quarterly Report on Form 10-Q for the quarter ended June 30, 2014).\*
- 10.28 Form of Terms of Deferred Stock Unit Awards under the Ferro Corporation 2006 Long-Term Incentive Compensation Plan (incorporated by reference to Exhibit 10.24 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2008).\*
- 10.29 Ferro Corporation 2010 Long-Term Incentive Plan (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K, filed May 6, 2010).\*
- 10.30 Form of Terms of Nonstatutory Stock Option Grants under the Ferro Corporation 2010 Long-Term Incentive Plan (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Quarterly Report on Form 10-Q for the quarter ended March 31, 2012).\*
- 10.31 Form of Terms of Performance Share Unit Awards under the Ferro Corporation 2010 Long-Term Incentive Plan (incorporated by reference to Exhibit 10.2 to Ferro Corporation's Quarterly Report on Form 10-Q for the quarter ended March 31, 2012).\*
- 10.32 Form of Terms of Restricted Share Unit Awards under the Ferro Corporation 2010 Long-Term Incentive Plan (incorporated by reference to Exhibit 10.3 to Ferro Corporation's Quarterly Report on Form 10-Q for the quarter ended March 31, 2012).\*
- 10.33 Ferro Corporation 2013 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K, filed May 23, 2013).\*
- 10.34 Form of Terms of Nonstatutory Stock Options Grants under the Ferro Corporation 2013 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.5 to Ferro Corporation's Quarterly Report on Form 10-Q for the quarter ended June 30, 2013).\*
- 10.35 Form of Terms of Performance Share Unit Awards under the Ferro Corporation 2013 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.6 to Ferro Corporation's Quarterly Report on Form 10-Q for the quarter ended June 30, 2013).\*
- 10.36 Form of Terms of Restricted Share Unit Awards under the Ferro Corporation 2013 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.7 to Ferro Corporation's Quarterly Report on Form 10-Q for the quarter ended June 30, 2013).\*
- 10.37 Terms of Retention Restricted Stock Units Award for Mr. Peter T. Thomas (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K, filed on December 30, 2014).\*

- 10.38 Amendment to the Ferro Corporation Deferred Compensation Plan for Executive Employees (incorporated by reference to Exhibit 10.18 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2009).\*
- 10.39 Ferro Corporation Deferred Compensation Plan for Executive Employees (incorporated by reference to Exhibit 10.28 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2012).\*
- 10.40 Ferro Corporation Deferred Compensation Plan for Non-Employee Directors (incorporated by reference to Exhibit 10.29 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2012).\*
- 10.41 Ferro Corporation Deferred Compensation Plan for Non-Employee Directors Trust Agreement (incorporated by reference to Exhibit 10.26 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2011).\*
- 10.42 Ferro Corporation Supplemental Defined Benefit Plan for Executive Employees (incorporated by reference to Exhibit 10.31 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2012).\*
- 10.43 Amendment to the Ferro Corporation Supplemental Defined Contribution Plan for Executive Employees (incorporated by reference to Exhibit 10.23 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2009).\*
- 10.44 Ferro Corporation Supplemental Defined Contribution Plan for Executive Employees (incorporated by reference to Exhibit 10.31 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2012).\*

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|         |   |
|---------|---|
| 10.45   | Form of Indemnification Agreement (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K, filed June 26, 2013).*  |
| 10.46   | Change in Control Agreement, dated March 22, 2013, between Peter T. Thomas and Ferro Corporation (incorporated by reference to Exhibit 10.5 to Ferro Corporation's Quarterly Report on Form 10-Q for the quarter ended March 31, 2013).*  |
| 10.47   | Form of Change in Control Agreement, dated May 2, 2012, between Jeffrey R. Rutherford and Ferro Corporation.  |
| 10.48   | Form of Change in Control Agreement, dated January 1, 2009 (Mark H. Duesenberg, and Ann E. Killian have entered into this form of change in control agreement) (incorporated by reference to Exhibit 10.2 to Ferro Corporation's Current Report on Form 8-K, filed January 7, 2009).* |
| 10.49   | Terms of Forfeited Bonus Reimbursement for Mr. Jeffrey L. Rutherford (incorporated by reference to Exhibit 10.5 to Ferro Corporation's Quarterly Report on Form 10-Q for the quarter ended March 31, 2012).*  |
| 10.50   | Ferro Corporation Executive Separation Policy (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K, filed June 28, 2010).*  |
| 10.51   | Separation and Release Agreement, dated as of October 16, 2012, between Michael J. Murry and Ferro Corporation (incorporated by reference to Exhibit 10.1 to Ferro Corporation's Current Report on Form 8-K, filed October 19, 2012).*  |
| 10.52   | Separation and Release Agreement, dated as of November 19, 2012, between James F. Kirsch and Ferro Corporation (incorporated by reference to Exhibit 10.40 to Ferro Corporation's Form 10-K for the year ended December 31, 2012).*   |
| 10.53   | Letter Agreement, dated November 12, 2012, between Peter T. Thomas and Ferro Corporation (incorporated by reference to Exhibit 10.41 to Ferro Corporation's Form 10-K for the year ended December 31, 2012).*   |
| 10.54   | Letter Agreement, dated November 12, 2012, between Jeffrey L. Rutherford and Ferro Corporation (incorporated by reference to Exhibit 10.28 to Ferro Corporation's Form 10-K for the year ended December 31, 2012).*   |
| 10.55   | Annual Incentive Plan (AIP) Summary Document (incorporated by reference to Exhibit 10.38 to Ferro Corporation's Annual Report on Form 10-K for the year ended December 31, 2010).*  |
| 12      | Ratio of Earnings to Fixed Charges and Ratio of Earnings to Combined Fixed Charges and Preferred Stock Dividends.   |
| 21      | List of Subsidiaries.   |
| 23.1    | Consent of Independent Registered Public Accounting Firm.   |
| 31.1    | Certification of Principal Executive Officer Pursuant to Rule 13a-14(a)/15d-14(a).  |
| 31.2    | Certification of Principal Financial Officer Pursuant to Rule 13a-14(a)/15d-14(a).  |
| 32.1    | Certification of Principal Executive Officer Pursuant to 18 U.S.C. 1350.  |
| 32.2    | Certification of Principal Financial Officer Pursuant to 18 U.S.C. 1350.  |
| 101     | XBRL Documents:   |
| 101.INS | XBRL Instance Document.**   |

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\* Indicates management contract or compensatory plan, contract or arrangement in which one or more Directors and/or executives of Ferro Corporation may be participants.

\*\* In accordance with Rule 406T of Regulation S-T, the XBRL related information in Exhibit 101 to this Annual Report on Form 10-K shall not be deemed to be "filed" for purposes of Section 18 of the Securities Exchange Act of 1934, or otherwise subject to the liability of that section, and shall not be part of any registration statement or other document filed under the Securities Act of 1933 or the Securities Exchange Act of 1934, except as shall be expressly set forth by specific reference in such filing.

