2017 ANNUAL REPORT

REPLIGEN

INSPIRING ADVANCES IN BIOPROCESSING

1 Acquired Spectrum, Inc.

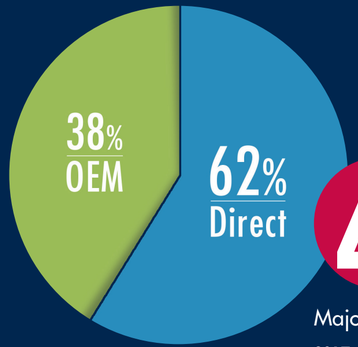
Transformative acquisition that significantly enhances our Filtration portfolio, expands our global commercial footprint and bolsters our innovation engine.

2 Delivered Robust Financial Performance

In 2017, we reported revenue growth of 35% to $141.2 million, a 143% increase in net income to $28.4 million and a 111% increase in fully diluted EPS to $0.72 (GAAP figures). Our growth was driven by increased sales of our direct-to-customer Chromatography and Filtration products.

3 Launched New Products Through Internal Innovation

Reflecting on our commitment to technology leadership, in Chromatography, we launched OPUS® R to provide a valuable resin recovery feature on our largest pre-packed columns. And in Filtration, we launched our single-use XCell™ ATF 10 cell retention device.



4 Majority Direct

2017 marked the first year for which the majority of sales - 62% - were direct to biopharmaceutical manufacturing customers (end users) versus OEM sales through supply agreements with life sciences companies.

5 Raised Over $129 Million

We raised over $129 million in an underwritten public equity offering, led by J.P. Morgan Securities LLC, to support ongoing internal investment and potential acquisitions.

6 Increased Manufacturing Capacity

To meet the growing demand for our direct-to-customer products in Filtration and Chromatography, we expanded our manufacturing capacity, invested in new facilities, and gained additional capacity with our acquisition of Spectrum.

7 Expanded Our Commercial Organization

We more than doubled the number of field employees (direct sales, field applications, field service) to 54 as of February 1, 2018, and expanded beyond the U.S. and Europe to include a much larger direct presence in Asia.

OUR 2017 PERFORMANCE FULLY SUPPORTS OUR MISSION TO BECOME AN INDUSTRY LEADER IN BIOPROCESSING BY DELIVERING INNOVATIVE TECHNOLOGIES AND SOLUTIONS THAT SET NEW STANDARDS.

Tony J. Hunt
President and CEO

Dear Shareholder

I am very pleased to report that 2017 was a year of outstanding growth and achievement for Repligen, both financially and operationally. We increased revenue by 35%, we significantly expanded our direct product portfolio, we doubled the size of our global sales team, and we added manufacturing capacity to keep ahead of increased demand for our products.

We have firmly established the Repligen brand to represent technology leadership in the bioprocessing industry through our ongoing commitment to innovation and our customer-first culture. We could not have done this without our dedicated employees – now 475 worldwide – who in 2017 did a remarkable job balancing acquisition and integration demands to deliver exceptional results for the Company, our customers and our shareholders. Their passion is what drives our success and differentiates us in the world of bioprocessing.

Realizing Our Vision

Over the past several years, our team has worked hard to fulfill our vision to build a best-in-class bioprocessing company serving biopharmaceutical drug manufacturers worldwide. We are proud of being proactive in providing these customers new and better bioprocessing tools for manufacturing a growing base of advanced biological drugs that are improving the lives of patients worldwide. We are committed to providing differentiated high-value technologies and

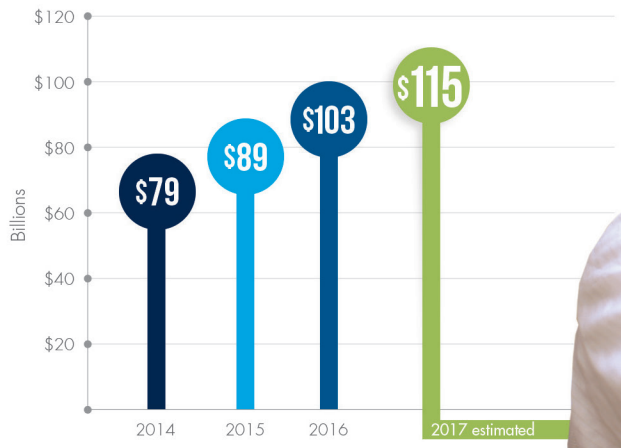
solutions that improve biologics manufacturing by, for example, improving drug yield, lowering production costs, providing flexibility or portability and reducing manufacturing footprints. With a focus on providing disposable and easy-to-implement alternatives to traditional products, we believe we are well-positioned to gain market share as the industry increasingly embraces single-use products and continuous manufacturing processes.

Going Direct

With our acquisition of Spectrum, Inc. in August, we firmly established our direct-to-customer foothold in the bioprocessing industry. While our OEM Proteins franchise remains a solid and important part of our business, the Repligen story has become more significantly tied to our Filtration and Chromatography expertise and commercial execution, where strong relationships with end users inform our innovation engine. Today, our direct customers include the vast majority of biopharmaceutical developers and contract manufacturing organizations around the globe.

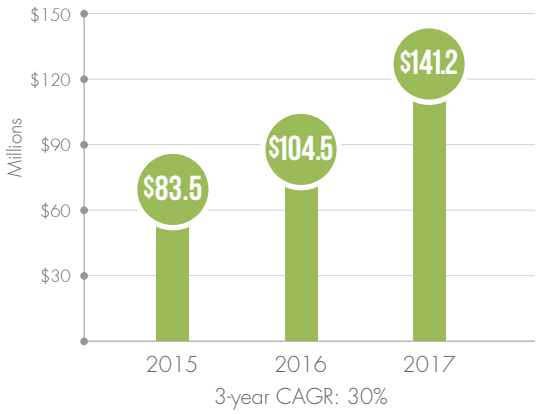
> “2017 marked the first year which the majority of our revenue, 62%, was generated from direct-to-consumer sales.”

Strong Biologics Market. *The commercial market for antibody-based biologics surpassed $115 billion in 2017.*



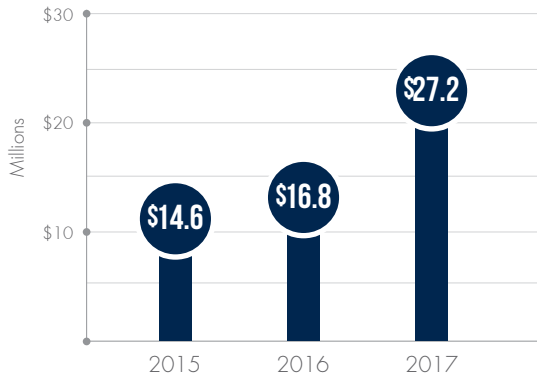
Strong Financial Performance. *We delivered strong double-digit revenue growth and margin expansion in 2017, continuing to execute on our vision for market success through technology leadership.*

Revenue

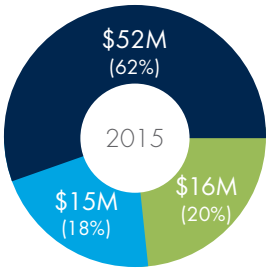


3-year CAGR: 30%

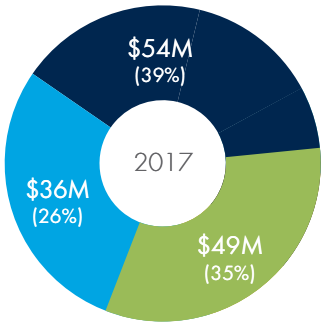
Adjusted Net Income



Achieving Our Goals. *In 2017, we continued to accelerate the adoption of our direct-to-customer Chromatography and Filtration products. Direct sales accounted for 62% of our total revenue, up from 48% in 2016 and 37% in 2015.*



$83.5M Sales



$141.2M Sales

Direct Sales	OEM Sales
Chromatography	Proteins
Filtration	

Execution on Our Goals

As we entered 2017, we said this would be a year of execution, and I'll share some points on how we have delivered on this commitment:

• We achieved $141M in revenue, up 35% year-on-year, with 39% growth in GAAP net income and 60% growth in adjusted net income. We reported a $0.38 gain in GAAP earnings per share to reach $0.72, and a $0.20 gain in adjusted earnings per share to reach $0.69.

• We accelerated the adoption and sales of our direct products which jumped to over 60% of total revenue in 2017, up from 48% in 2016, a trend that we expect to continue.

• We achieved organic growth of 19% in our Filtration and Chromatography businesses and 9% overall for the company - well above the bioprocessing industry average for the year.

• We completed the integration of TangenX Technology Corporation and increased the adoption of TangenX SIUS™ TFF single-use cassettes through our expanded salesforce. We recorded $7.9 million in revenue from TangenX products, representing 37% year-on-year growth.

• We acquired Spectrum, Inc., our most transformative deal to date. Spectrum greatly enhances our Filtration portfolio with KrosFlo® hollow fiber TFF systems and ProConnex® single-use flow path products. We achieved $19.3 million in Spectrum sales during our 5 months of ownership, representing 24% year-on-year growth (pro forma). We anticipated the deal would be breakeven to adjusted EPS in 2017, and it is already accretive.

• With the addition of the Spectrum, we significantly expanded our global commercial organization and our R&D team, establishing

Acquired Spectrum Inc. *Our Filtration portfolio expands with the addition of KrosFlo® hollow-fiber TFF systems and solutions.*

a strong foundation for future growth and innovation. Our commercial team now includes 36 sales managers worldwide, including a direct presence in Asia, and representing a four-fold increase in sales staff over the last two years.

• We raised over $129 million in cash in a public equity offering led by J.P. Morgan Securities, LLC, providing flexibility for future investments.

• We expanded our operations to accommodate future growth in our direct-to-customer product lines. In our Waltham, MA facility we increased our OPUS® production capacity to seven suites from four, and in Germany we relocated our OPUS PD (process development) operations to Ravensburg and added staff to stay ahead of increasing demand. In addition, we identified a 64,000 square foot facility in Marlboro, MA that will house the manufacturing of TangenX flat sheet cassettes and large-scale Spectrum KrosFlo TFF systems.

• We launched exciting new products in 2017 through our internal R&D efforts. These include OPUS R pre-packed columns, which feature a resin recovery port. We also developed and introduced a single-use version of our XCell™ ATF10 device for use in perfusion and n-1 applications. Also through Spectrum, we introduced TFDF filtration products in 2017 - a real innovation in hollow fiber technology that uniquely combines the benefits of tangential flow and depth filtration.

XCell™ ATF10 single-use *cell retention device*

OPUS large-scale *with resin recovery*

TangenX SIUS™ *single-use TFF cassettes*

Our 2018 Focus

As we advance here in 2018, we are excited about our prospects for continued growth. Our strategic priorities are centered on the following areas:

1. **Spectrum integration and synergies**
Ongoing commercial and operational integration of Spectrum, to realize revenue and cost synergies through cross-selling, geographic expansion and new product development.

2. **Increased market penetration**
Accelerated adoption of our entire portfolio of bioprocessing products in the U.S., Europe and Asia through our larger direct sales footprint in all regions. Increased market penetration through technology leadership and unparalleled responsiveness to our customers' needs and challenges.

3. **Investment in capacity and systems**
Investment in our facilities and systems to support growing demand for our products.

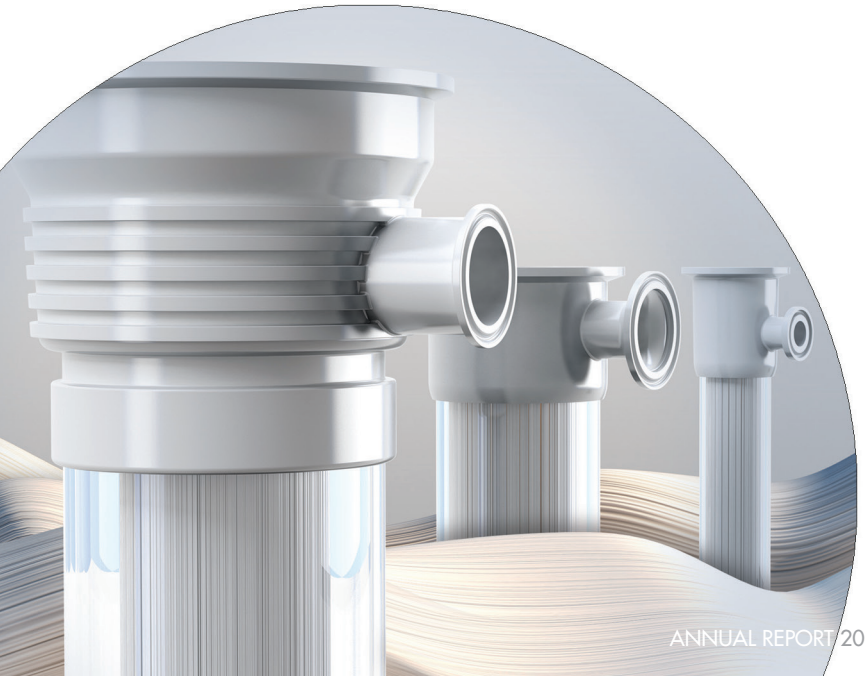
4. **Innovation**
Internal development of new and next-generation products, with a focus on our direct-to-customer Filtration and Chromatography portfolios.

5. **Financial performance**
Deliver double-digit growth to achieve $180 - $186 million in revenue and expand gross margin and operating margin.

In summary, we had a successful 2017 and our team continues to execute on our long term vision. Our investments in our direct-to-customer businesses are paying off, and our expectation is that Chromatography and Filtration will continue to be the major drivers of growth for the company in 2018 and beyond. Our balance sheet is strong, our R&D pipeline is rich, and we are well positioned to demonstrate leadership in the bioprocessing market.

I wish to thank our employees, our loyal shareholders and our customers for their part in Repligen's progress toward becoming a best-in-class bioprocessing technology company and a trusted partner in the production of biological drugs.

Tony J. Hunt



REPLIGEN CORPORATION
FORM 10-K
2017

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

FORM 10-K

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

For the fiscal year ended December 31, 2017

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 000-14656

REPLIGEN CORPORATION
(Exact name of registrant as specified in its charter)

Delaware	**04-2729386**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
41 Seyon Street, Bldg. 1, Suite 100 Waltham, MA	**02453**
(Address of principal executive offices)	**(Zip Code)**

Registrant's telephone number, including area code: (781) 250-0111

Securities registered pursuant to Section 12(b) of the Act:
Title of Each Class
Common Stock, $0.01 Par Value Per Share
Name of Exchange on Which Registered
The NASDAQ Stock Market LLC
Securities registered pursuant to Section 12(g) of the Act: None

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

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

Indicate by checkmark 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 Website, 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 (§229.405 of this chapter) is not contained herein, 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," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer ☒	Accelerated filer ☐
Non-accelerated filer ☐ (Do not check if a smaller reporting company)	Smaller reporting company ☐
	Emerging growth company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. Yes ☐ No ☐.

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 the voting and non-voting common equity held by non-affiliates as of June 30, 2017, the last business day of the registrant's most recently completed second fiscal quarter, was $1,225,041,904.

The number of shares of the registrant's common stock outstanding as of February 15, 2018 was 43,588,469.

Documents Incorporated By Reference

The registrant intends to file a proxy statement pursuant to Regulation 14A within 120 days of the end of the fiscal year ended December 31, 2017. Portions of such proxy statement are incorporated by reference into Part III of this Annual Report on Form 10-K.

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FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K contains forward-looking statements which are made pursuant to the safe harbor provisions of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). The forward-looking statements in this Annual Report on Form 10-K do not constitute guarantees of future performance. Investors are cautioned that statements in this Annual Report on Form 10-K that are not strictly historical statements, including, without limitation, statements regarding current or future financial performance, potential impairment of future earnings, management's strategy, plans and objectives for future operations or acquisitions, product development and sales, product candidate research and development, selling, general and administrative expenditures, intellectual property, development and manufacturing plans, availability of materials, and adequacy of capital resources and financing plans constitute forward-looking statements. Such forward-looking statements are subject to a number of risks and uncertainties that could cause actual results to differ materially from those anticipated, including, without limitation, the risks identified under the caption "Risk Factors" and other risks detailed in this Annual Report on Form 10-K and our other filings with the Securities and Exchange Commission. We assume no obligation to update any forward-looking information contained in this Annual Report on Form 10-K, except as required by law.

PART I

ITEM 1. BUSINESS

The following discussion of our business contains forward-looking statements that involve risks and uncertainties. When used in this report, the words "intend," "anticipate," "believe," "estimate," "plan" and "expect" and similar expressions as they relate to us are included to identify forward-looking statements. Our actual results could differ materially from those anticipated in these forward-looking statements and are a result of certain factors, including those set forth under "Risk Factors" and elsewhere in this Annual Report on Form 10-K.

References throughout this Annual Report on Form 10-K to "Repligen", "we", "us", "our", or the "Company" refer to Repligen Corporation and its subsidiaries, taken as a whole, unless the context otherwise indicates.

Overview

Repligen is a leading provider of advanced bioprocessing technology and solutions used in the process of manufacturing biologic drugs. Our products are made to substantially increase biopharmaceutical manufacturing efficiencies and flexibility. As the global biologics market continues to experience strong growth and expansion, our customers – primarily large biopharmaceutical companies and contract manufacturing organizations – face critical production cost, capacity, quality and time pressures that our products are made to address. Our commitment to bioprocessing is helping to set new standards for the way our customers manufacture biologic drugs – monoclonal antibodies, recombinant proteins, vaccines and gene therapies. We are dedicated to inspiring advances in bioprocessing as a trusted partner in the production of biologic drugs that improve human health worldwide.

We currently operate as one bioprocessing business, with a comprehensive suite of products to serve both upstream and downstream processes in biologic drug manufacturing. Building on over 35 years of industry expertise, we have developed a broad and diversified product portfolio that reflects our commitment to build a best-in-class bioprocessing technology company with a world-class direct sales and commercial organization.

We are committed to capitalizing on growth opportunities and maximizing the value of our product platform through both organic growth initiatives (internal innovation and commercial leverage) and targeted acquisitions.

History

Prior to 2012, the Company was focused on drug development, with clinical trial costs supported by bioprocessing product sales. At that time our bioprocessing business was largely represented by sales of Protein A ligands, which we sell through long term OEM supply agreements. Our 2011 acquisition of Novozymes Biopharma Sweden AB (the "Novozymes Acquisition") further expanded our proteins product portfolio and provided impetus to set a new direction for the company. By mid-2012, we permanently discontinued and have since divested all drug development programs. We retained our proteins OEM business and, through internal innovation and strategic acquisitions, we have built chromatography and filtration product offerings that we sell direct to biologics manufacturers. We continue to seek out strategic opportunities to strengthen and expand our bioprocessing business.

Our Products

OEM Products (Proteins)

Our OEM products are represented by our Protein A ligands and cell culture growth factor products.

Protein A

We are a leading provider of Protein A ligands to life sciences companies. Protein A ligands are an essential "binding" component of Protein A chromatography resins used in the purification of virtually all monoclonal

antibody (mAb) based drugs on the market or in development. We manufacture multiple forms of Protein A ligands under long-term supply agreements with major life sciences companies including GE Healthcare and MilliporeSigma, who in turn sell their Protein A chromatography resins to end users (mAb manufacturers). We have two manufacturing sites supporting overall global demand for our Protein A ligands: one in Lund, Sweden and another in Waltham, MA.

Protein A chromatography resins are considered the industry standard for purification of antibody-based therapeutics due to the ability of the Protein A ligand to selectively bind to or "capture" antibodies from crude protein mixtures. Protein A resins are packed into the first chromatography column of typically three columns used in a mAb purification process. As a result of Protein A's high affinity for antibodies, the mAb product is highly purified and concentrated within this first capture step before moving to polishing steps.

Growth Factors

Most biopharmaceuticals are produced through an upstream mammalian cell fermentation process. In order to stimulate increase cell growth and maximize overall yield from a bioreactor, manufacturers often add growth factors, such as insulin, to their cell culture fermentation media. As part of the Novozymes Acquisition in 2011, we gained several cell culture growth factor additives. Among those products is LONG®R3 IGF-1, our insulin-like growth factor that has been shown to be up to 100 times more biologically potent than insulin (the industry standard), thereby increasing recombinant protein production in cell culture fermentation applications. LONG R3 IGF-1 is sold through a distribution partnership with MilliporeSigma.

Direct-to-Customer Products (Chromatography and Filtration)

Since 2012, we have significantly expanded our direct-to-customer presence through our Chromatography and Filtration franchises, which include highly differentiated, market-leading products and systems. We have diversified and grown our direct-to-customer product offering through internal innovation and through disciplined, accretive acquisitions of assets or businesses that leverage existing product lines and/or expand our customer and geographic scope.

To support our sales goals for our direct-to-consumer products, we have invested in our commercial organization, expanding from 3 field employees in 2014 to 54 field employees currently, which include sales reps, field applications specialists and field service personnel. In addition, to meet increased demand for our products, we continue to invest in increasing the volume and scale of manufacturing at our facilities in the United States, Sweden and Germany.

Chromatography

Our Chromatography franchise includes a number of products used in the downstream purification and quality control of biological drugs. The main driver of growth in this portfolio is our process-scale OPUS pre-packed chromatography ("PPC") column line.

Our other products include chromatography resins (such as CaptivA®) used in a small number of commercial drug processes and ELISA test kits used by quality control departments to detect and measure the presence of leached Protein A and/or growth factor in the final product.

OPUS

Our Chromatography franchise features pre-packed chromatography columns under our OPUS brand. OPUS columns, which we deliver to our customers pre-packed with their choice of chromatography resin, are single-campaign ("single-use") disposable columns that replace the use of traditional and more permanent glass columns used in downstream purification processes. By designing OPUS to be the most technologically

advanced and most flexible option for the purification of biologics from process development through clinical-scale and some commercial manufacturing, Repligen has become a leader in the pre-packed column market. The customization and ready-to-use nature of our OPUS columns makes them ideal for purification of antibodies and recombinant proteins. Biomanufacturers value the time savings, labor and utility cost savings, product consistency and the "plug and play" convenience of OPUS.

We launched our first production-scale OPUS columns in 2012, and have since added larger diameter options such as OPUS 45 and OPUS 60. We have also introduced next-generation features such as a resin recovery port on our larger columns. This allows our customers to reuse the recovered resin in other applications. The unpacking port feature was made available in the first quarter of 2017 on our largest production-scale OPUS columns.

Through our acquisition of Atoll GmbH in 2016, we established a customer-facing center in Europe and expanded our portfolio to include our smaller-scale columns, named OPUS PD, that are used in high throughput process development screening, viral validation studies and scale down validation of chromatography processes. We maintain a broad and customizable pre-packed column product line to meet our customers' diverse needs.

Other Chromatography

Also included in our Chromatography portfolio are ELISA kits, which are analytical test kits to detect the presence of proteins and growth factors, and chromatography resins, including our CaptivA® brand. In addition, following our acquisition of Spectrum in 2017, we sell Spectra/Chrom® liquid chromatography products as part of our chromatography product line.

Filtration

XCell™ ATF

Our Filtration products offer a number of advantages to manufacturers of biologic drugs at volumes that span from pilot studies to clinical and commercial-scale production. We first established our Filtration franchise through our acquisition of XCell™ Alternating Tangential Flow ("ATF") assets from Refine Technology ("Refine") in 2014. XCell ATF systems are used primarily in upstream perfusion, or "continuous manufacturing", processes.

XCell ATF is a technologically advanced filtration device used in upstream processes to continuously remove cellular metabolic waste products during the course of a fermentation run, freeing healthy cells to continue producing the biologic drug of interest. XCell ATF was designed to both increase the density of cells in a bioreactor and extend the production run. By continuously removing waste products from the fermenter, the XCell ATF System routinely increases cell densities to 2- or 3-times the levels achieved by standard batch fermentation. As a result, product yield is increased, which improves facility utilization and can reduce the size of a bioreactor required to manufacture a given volume of biologic drug product. This is important to biomanufacturers who seek to maximize output from their existing facilities. XCell ATF Systems are suitable for use in laboratory and scale-up all the way to production bioreactors as large as 2,000 liters.

Through internal innovation, we developed and in 2016 launched single-use formats of the original stainless steel XCell ATF device to address increasing industry demand for "plug-and-play" technology. The XCell ATF device is now available to customers in both its original configuration (steel housing and replaceable filters) in all sizes (2, 4, 6 and 10), and/or as a single-use device (disposable housing/filter combination) in most sizes (2, 6, and 10). The availability of XCell ATF in a single-use format eliminates the pre-use workflow associated with autoclaving, leading to an 80% reduction in implementation time. The single-use format also enables our customers to accelerate evaluations of the product with a lower initial overall cost of ownership. Based on strong demand, we have continued to expand the single-use XCell ATF offering.

Sius™ TFF (TangenX)

In December 2016, we acquired TangenX Technology Corporation ("TangenX"), balancing our upstream XCell ATF offering with a downstream portfolio of flat-sheet tangential flow filters (TFF) and cassettes used in downstream biologic drug purification and formulation processes. The TangenX portfolio includes our single-use Sius™ TFF brand, providing customers with a high-performance, low-cost alternative to reusable TFF cassettes.

TFF is a rapid and efficient method for separation and purification of biomolecules that is widely used in laboratory, process development and process scale applications in biopharmaceutical manufacturing. Sius is an innovative single-use TFF line of cassettes and hardware for lab-scale through large-scale biopharmaceutical manufacturing. Single-use Sius TFF cassettes with enclosed flat sheet membranes are designed to provide a high performing membrane at significantly lower product and labor costs than reusable TFF products. Each disposable cassette is delivered pre-sanitized, integrity tested and ready to be equilibrated and used for tangential flow diafiltration and ultrafiltration processing. Use of Sius TFF cassettes eliminates non-value added steps of cleaning and flushing required in reusable TFF products. The cassettes are interchangeable with filter hardware from multiple manufacturers, simplifying customer trial and adoption of Sius products.

KrosFlo®, ProConnex® (Spectrum)

We acquired Spectrum and its subsidiaries in August 2017 to strengthen our filtration business with the addition of a leading portfolio of hollow-fiber (HF) filters and modules, single-use flow path connectors and TFF filtration systems. Spectrum products are used in bench-top through commercial-scale processes, primarily for the filtration, isolation, purification and concentration of biologics and diagnostic products. Our Spectrum filtration products offer both standard and customized solutions to bioprocessing customers, with particular strength in consumable and single-use offerings.

With the addition of Spectrum, we now in-house manufacture hollow-fiber filters that can be used in our XCell ATF system. In addition, we increased our direct sales presence in Europe and Asia, and we diversified our end markets beyond monoclonal antibodies to include vaccines, recombinant protein and gene therapies.

Spectrum's filtration brands include its KrosFlo® line of hollow-fiber cartridges and TFF systems, its Spectra/Por® portfolio of laboratory and process dialysis products and its Pro-Connex® single-use hollow-fiber Module-Bag-Tubing sets.

Corporate Information

We are a Delaware corporation with global headquarters in Waltham, Massachusetts. We were incorporated in 1981 and became a publicly traded company in 1986. Our common stock is listed on The Nasdaq Global Market under the symbol "RGEN". We have over 470 employees and operate globally with offices and manufacturing sites located at multiple locations in the United States, Europe and Asia. Our principal executive offices are located at 41 Seyon Street, Waltham, Massachusetts 02453, our website is www.repligen.com and our telephone number is (781) 250-0111.

Our Market Opportunity

The global biologics drug market is estimated to be over $200 billion. This market includes therapeutic antibodies, recombinant proteins and vaccines. Antibody-based biologics alone accounted for over $100 billion of global biopharma revenue and represented a majority of the top 10 best-selling drugs across the pharmaceutical industry in 2016. Industry sources project the biologics market to grow at a rate of 8%-10% annually over the next five years, driven by strength in the monoclonal antibody (mAb) class of biologics, as evidenced by the rate of new approvals, expanded labels for marketed antibodies and the emergence of biosimilar versions of originator mAbs.

In 2017, a record 14 antibodies (10 originator and four biosimilar antibodies) were approved by the U.S. Food and Drug Administration ("FDA") to treat a diverse range of diseases. There are currently more than 80 mAbs on the market and more than 400 in various stages of clinical development addressing a wide range of medical conditions including asthma, migraines and Alzheimer's disease.

In addition to investments in the discovery and development of novel biologic drugs, there has been substantial investment in follow-on products (biosimilars) by generic and specialty pharmaceutical as well as large biopharmaceutical companies. Development of follow-on products has accelerated as the first major mAbs have come off patent in the European Union and United States. Due to the high cost of biologic drugs, many countries in the developing and emerging markets have been aggressively investing in biomanufacturing capabilities to supply lower cost biosimilars for the local markets. For both originator and follow-on biologics manufacturing, Repligen products are well-positioned to enable greater manufacturing flexibility, production yields and lower costs through improved process efficiencies.

The Biologics Manufacturing Process

Manufacturing biologic drugs requires three fundamental steps. First, upstream manufacturing involves the production of the biologic by living cells that are grown in a bioreactor under controlled conditions. These cells, or factories, are highly sensitive to the conditions under which they grow, including the composition of the cell culture media and the growth factors used to stimulate increased cell growth and protein production, or titre. In the second, downstream step, the biologic must be separated and purified, typically through various filtration and chromatography (purification) steps. In the third stage of the process, the purified biologic drug is formulated, quality controlled and packaged into its final injectable form.

Detailed specifications for a drug's manufacturing process are included in the applications that biopharmaceutical companies file for marketing approval with regulators such as the FDA and the European Medicines Agency. Once a drug advances to late-stage clinical trials, the commercial manufacturing process is typically established by the developer, and the process specifications become part of the regulatory approval package. As a result, bioprocessing products that are included in these manufacturing specifications can be very "sticky" due to the costs and regulatory uncertainties associated with displacing them.

Our Strategy

We are focused on the development, production and commercialization of differentiated bioprocessing technologies and solutions that address pressure points in the inherently complex biologics manufacturing process and deliver substantial value to our customers. We are committed to supporting our customers with strong customer service and applications expertise.

We intend to build on our recent history of developing market-leading solutions and delivering strong financial performance through the following strategies:

- *Continued innovation*. We plan to capitalize on our internal technological expertise to develop products that address unmet needs in upstream and downstream bioprocessing. We intend to invest further in our core Proteins franchise while developing platform and derivative products to support our Filtration and Chromatography franchises.
- *Platforming our products.* A key strategy for accelerating market adoption of our products is delivery of enabling technologies that become the standard, or "platform," technology in markets where we compete. We focus our efforts on winning early-stage technology evaluations through direct interaction with the key biomanufacturing decision makers in process development labs. This strategy is designed to establish both early adoption of our enabling technologies at key accounts and accelerate the implementation of our products as platform products, thereby strengthening our competitive advantage and contributing to long-term growth.

- *Targeted acquisitions*. We have recently completed strategic acquisitions that strengthen our market position, and we continue to selectively pursue acquisitions and intend to leverage our balance sheet to acquire technologies and products that improve our overall financial performance by improving our competitiveness and/or moving us into adjacent markets with common commercial call points.
- *Geographical expansion*. We will continue to incrementally expand our global commercial team and distribution channels, particularly in the United States, Europe and Asia, to increase our global presence and simplify our interactions and transactions with customers.
- *Operational efficiency*. In recognition of the increasing size and scale of our organization, we continue to invest in systems to support our global operations in order to optimize resources and productivity.

Research and Development

Our research activities are focused on developing new high-value bioprocessing products. Specifically, we plan to focus these efforts on expanding our product portfolio and applications for our OPUS PPC columns, XCell ATF systems, Sius TFF, KrosFlo®, TFF systems and other products, and developing next generation Protein A ligands. Research and development expenses totaled approximately $8.7 million, $7.4 million and $5.7 million for the years ended December 31, 2017, 2016 and 2015, respectively.

Sales and Marketing

Our sales and marketing strategy supports our objective of strengthening our position as a leading provider of products and services, addressing upstream, downstream and quality control needs of bioprocessing customers in the biopharmaceutical industry.

OEM Agreements

For our Proteins franchise, we are committed to being a partner of choice for our customers with distributor and supply agreements in place with large life sciences companies such as GE Healthcare, MilliporeSigma and Purolite. The GE Healthcare Protein A supply agreement relating to our Lund, Sweden facility runs, pursuant to its terms, through 2019. The GE Healthcare Protein A supply agreement relating to our Waltham, Massachusetts facility runs, pursuant to its terms, through 2021. Our Protein A supply agreement with MilliporeSigma runs, pursuant to its terms, through 2023, and in 2017 we secured a Protein A supply agreement with Purolite that runs, pursuant to its terms, to November 2022 with an option for renewal through 2025. Our dual manufacturing capability provides strong business continuity and reduces overall supply risk for our OEM customers.

Direct-to-Customer Team

Supporting our direct-to-customer Chromatography and Filtration franchises, we have invested in our commercial organization, expanding from 3 field employees in 2014 to 54 field employees (field sales, applications and service) in the U.S., Europe and Asia as of February 15, 2018. This includes the team of 26 highly experienced field personnel that we added with our acquisition of Spectrum in 2017. With the acquisition, we have greatly expanded our direct sales team in Asia, where we also work effectively with key distributors to serve our expanding customer base. In addition, we have 41 employees in marketing, product management and customer service support to our expanding customer base. In Asia, we also work effectively with key distributors.

As part of the Spectrum integration process, we expect to transition to a hybrid sales model by the end of the first quarter of 2018, whereby all sales staff will represent all Repligen products across our Chromatography and Filtration portfolios. Our bioprocess account managers will be supported in each region by technically trained field applications specialists and field service providers, who can work closely with customers on product demonstrations, implementation and support. We believe that this model will help drive further adoption at our key accounts and also open up new sales opportunities within each region.

Segment and Geographic Areas

We have one reportable segment. Segment and geographical information is contained in Note 2 of the notes to our consolidated financial statements as of and for the years ended December 31, 2017, 2016, and 2015.

Significant Customers and Geographic Reporting

Customers for our bioprocessing products include major life science companies, contract manufacturing organizations, biopharmaceutical companies, diagnostics companies and laboratory researchers.

The following table represents the Company's total revenue by geographic area (based on the location of the customer):

	Years ended December 31,		
	2017	2016	2015
United States	43%	39%	28%
Sweden	20%	29%	37%
United Kingdom	4%	7%	17%
Other	33%	25%	18%
Total	100%	100%	100%

GE Healthcare, our largest bioprocessing customer, accounted for 21%, 29% and 37% of total revenues in the fiscal years ended December 31, 2017, 2016 and 2015, respectively. MilliporeSigma, our second largest bioprocessing customer, accounted for 18%, 28% and 29% of total revenues in the fiscal years ended December 31, 2017, 2016 and 2015, respectively.

Employees

As of February 15, 2018, we had 476 employees. Of those employees, 42 were engaged in engineering and research and development, 289 in manufacturing, 95 in sales and marketing and 50 in administrative functions. Each of our employees has signed a confidentiality agreement. None of our U.S. employees are covered by collective bargaining agreements. We have one collective bargaining agreement with two unions that covers our 60 employees in Sweden, comprising approximately 13% of our total workforce. We renewed these collective bargaining agreements during 2017, and the new collective bargaining agreements expire on March 31, 2019. We consider our employee relations to be satisfactory.

Patents, Licenses and Proprietary Rights

We consider patents to be an important element in the protection of our competitive and proprietary position and actively, and selectively, pursue patent protection in the United States and in major countries abroad. As further described below, we own or have exclusive rights to a number of U.S. patents and U.S. pending patent applications as well as corresponding foreign patents and patent applications. The expiration of key patents owned or licensed by us or the failure of patents to issue on pending patent applications could create increased competition, with potential adverse effects on our business prospects.

Other forms of market protection, including trade secrets and know-how, are also considered important elements of our proprietary strategy. Our policy is to require each of our employees, consultants, business partners, and major customers to execute confidentiality agreements upon the commencement of an employment, consulting, business relationship, or product related audit with us. These agreements provide that all confidential information developed or made known to the other party during the course of the relationship with us is to be kept confidential and not disclosed to third parties except in specific circumstances. In the case of employees and consultants, the agreements generally provide that all inventions conceived by the individual in the course of rendering services to Repligen shall be our exclusive property and must be assigned to Repligen.

Protein A

We have developed proprietary technology, trade secrets, and know-how relating to the manufacture of recombinant Protein A at a scale and quality standard that is consistent with the requirements of the biopharmaceutical industry. In addition, our U.S. Patent No. 7,691,608, "Nucleic Acids Encoding Recombinant Protein A," claims an isolated nucleic acid molecule that encodes a Protein A molecule with an amino acid sequence identical to that of the natural Protein A molecule, which has long been commercialized for bioprocessing applications. This U.S. patent, with the term adjustment that was granted, will remain in effect until June 2028. Foreign equivalents of this patent have been issued in Sweden, Netherlands, Great Britain, France, Germany, and Canada. The claims of U.S. Patent No. 7,691,608 cover compositions of matter including isolated nucleic acids, expression vectors, bacterial cells that include the nucleic acids, as well as methods of producing truncated Protein A polypeptides, methods of producing affinity chromatography resins, and methods of purifying proteins.

OPUS

Since 2012, we filed five provisional patent applications with the U.S. Patent and Trademark Office ("USPTO") and four patent applications based on those provisional patent applications, which cover certain unique methods and features of our OPUS pre-packed columns. These unique methods and features include methods of making and loading these chromatography columns as well as the columns themselves; methods of sterilizing plastic chromatography columns; disposable (single use) alternating tangential flow filtration units and methods of manufacture, testing, and use; methods of recovering packing medium from pre-packed chromatography columns and specialized chromatography columns for use in such methods; and methods and systems for removing air from chromatography columns using specialized tubing and valve systems. In addition, we have filed international patent cooperation treaty applications as a utility application with the USPTO on the basis of the provisional applications. Certain of these patent applications related to the OPUS pre-packed column are pending in the United States, Europe, Hong Kong, India, and Japan, and certain related patents have been granted in Australia and Canada.

XCell ATF Systems

As part of the Refine Acquisition, we acquired the exclusive rights to an issued U.S. patent (US 6,544,424) covering the ATF System and a process related to the filtration of biologic fluids from a bioreactor through hollow fiber filters by the action of a diaphragm pump that creates alternating tangential flow through the filter. The patent expires in 2020.

Another patent has been issued in the U.S. covering improvements on the original ATF design that include a screen filter module (U.S. Patent No. 9,050,547). This family of patents and applications has issued or is pending in Brazil, China, Germany, France, Great Britain, India, Korea and Sweden.

Other additional improvements on the original ATF systems and methods are covered by patents and patent applications pending in one or more of the U.S., Canada, China, Europe, Hong Kong, India, Japan, and Korea. These patents and patent applications expire between 2029 and 2033. In particular, one family of improvement patents and applications relating to ATF systems has issued in Japan and China. These patents and applications include claims that cover enclosed filtration and bioreactor systems and dual pump systems.

Another family of improvement patents and applications relating to ATF systems has issued in the U.S. (U.S. Patent No. 9,446,354) with claims that cover product concentration systems and corresponding methods. Corresponding applications are pending in the U.S., Europe, Korea, and Hong Kong.

Spectrum

In August 2017, Repligen acquired Spectrum, including its patent portfolio. Spectrum currently has 2 issued patents and one pending patent application in the United States and 2 pending applications in other countries related to surgical drapes, cell proliferation methods, and thick wall, hollow fiber tangential flow filters.

Histone Deacetylase Inhibitors

In 2007, we entered into an exclusive license agreement with The Scripps Research Institute for worldwide rights to a patent application claiming compounds and methods for treating Friedreich's ataxia with inhibitors of histone deacetylase. We extended this original work and filed additional patent applications which claim both methods and compositions for treating Friedreich's ataxia. On January 21, 2014, we out-licensed all of our intellectual property related to HDAC to BioMarin Pharmaceuticals Inc. ("BioMarin"), and BioMarin has assumed responsibility for maintaining existing intellectual property and prosecuting new intellectual property relating to this program. Our out-licensed HDAC portfolio included patent applications in the United States as well as patent applications in Europe, Canada, Japan and Australia. Patents, if any, that are granted in the U.S. based on these patent applications are expected to expire from 2029 to 2032.

Trademarks

Our ability to compete effectively in the marketplace is dependent in part on our ability to protect our intellectual property rights, which includes protecting the trademarks we use in connection with our products and services. We rely on several registered and unregistered trademarks to protect our brand. Repligen currently has 12 registered trademarks in the United States and 34 registrations in other countries. Repligen continues to file trademark applications and currently has 4 pending applications in the United States and 13 pending applications in other countries.

Spectrum currently has 25 registered trademarks in the United States and 2 registrations in other countries.

Licensing Agreements

HDAC Agreement with BioMarin

On January 21, 2014, we out-licensed our HDAC portfolio, which includes the Friedreich's ataxia program, to BioMarin. Friedreich's ataxia is an inherited disease that causes progressive damage to the nervous system resulting in symptoms ranging from impaired walking and speech problems to heart disease. Pursuant to the terms of the agreement, BioMarin agrees to use commercially reasonable efforts to commercialize HDAC portfolio products until the later of: (i) the expiration of the last-to-expire valid claim of an issued and unexpired patent or pending patent application claiming a compound included in the agreement or (ii) 10 years. Under the terms of the agreement, Repligen received an upfront payment of $2 million in January 2014 from BioMarin and we have the potential to receive up to $160 million in future milestone payments for BioMarin's development, regulatory approval, and commercial sale of portfolio compounds included in the agreement.

These potential milestone payments are approximately 37% related to clinical development and 63% related to initial commercial sales in specific geographies. In addition, Repligen is eligible to receive royalties on sales of qualified products developed. The royalty rates are tiered and begin in the mid-single-digits for the first HDAC portfolio product and for the first non-HDAC portfolio product with lesser amounts for any backup products developed under the agreement. Repligen's receipt of these royalties is subject to customary offsets and deductions. There are no refund provisions in this agreement. Royalties under this agreement are paid on a country-by-country basis during the period beginning on the first commercial sale of a compound in such country, until the later of: (i) the expiration of exclusivity period granted by a governmental authority to prevent the entry of generic product into such country; (ii) the expiration of the last-to-expire valid claim of an issued and unexpired patent or pending patent application claiming such compound in such country; or (iii) ten years

following the first commercial sale of such HDAC portfolio product in any country. Royalty payments on products derived from the compounds included in the agreement are calculated by multiplying net sales of such product for the calendar year by an applicable royalty rate based on incremental net sale amounts. We have no further obligations to BioMarin.

RG1068

Our clinical development portfolio previously included RG1068, a synthetic human hormone we had developed as a novel imaging agent for the improved detection of pancreatic duct abnormalities in combination with magnetic resonance imaging in patients with pancreatitis and potentially other pancreatic diseases. In December 23, 2014, Innovate Biopharmaceuticals, Inc. ("Innovate") acquired our RG1068 program for a nominal amount. Innovate is solely responsible for future development and commercialization of RG1068. If Innovate gains marketing approval and successfully commercializes RG1068, Repligen is eligible to receive royalties through the later of ten years after the first commercial sale or the entry of a generic equivalent into the U.S. market.

Competition

Our bioprocessing products compete on the basis of quality, performance, cost effectiveness, and application suitability with numerous established technologies. Additional products using new technologies that may be competitive with our products may also be introduced. Many of the companies selling or developing competitive products, which in some cases include GE Healthcare and MilliporeSigma, our two largest customers, have greater financial and human resources, research and development, manufacturing and marketing experience than we do. They may undertake their own development of products that are substantially similar to, or compete with, our products and they may succeed in developing products that are more effective or less costly than any that we may develop. These competitors may also prove to be more successful in their production, marketing and commercialization activities. We cannot be certain that the research, development and commercialization efforts of our competitors will not render any of our existing or potential products obsolete.

Manufacturing

We manufacture seven commercial forms of Protein A, including "native" Protein A for life sciences companies, including GE Healthcare, MilliporeSigma and Purolite, under long-term supply agreements which expire between 2019 and 2023. Native Protein A is manufactured in Lund, Sweden, while the recombinant forms are manufactured in both Waltham, Massachusetts and Lund, Sweden. We currently manufacture our growth factor products in Lund, Sweden. Our OPUS chromatography columns and XCell ATF System products are manufactured in Waltham, Massachusetts. Our OPUS PD columns are manufactured in Ravensburg, Germany, and our Sius TFF products are manufactured in Shrewsbury, Massachusetts. Our KrosFlo line of products is manufactured in Rancho Dominguez, California. Our Spectra/Pro and Pro-Connex products are manufactured in Irving, Texas, and our Spectra/Chrom products are manufactured in Houston, Texas.

We generally purchase raw materials from more than one commercially established company and believe that the necessary raw materials are currently commercially available in sufficient quantities necessary to meet market demand. However, there are only a limited number of suppliers of materials related to the XCell ATF System products, one of which is the primary supplier of materials used for consumable XCell ATF System products.

We utilize our own facilities in Waltham, Massachusetts and Lund, Sweden as well as third party contract manufacturing organizations to carry out certain fermentation and recovery operations, while the purification, immobilization, packaging and quality control testing of our bioprocessing products are conducted at our facilities. Our facilities located in Waltham, Massachusetts; Lund, Sweden; Ravensburg, Germany; and Rancho Dominguez, California are ISO 9001:2015 certified and maintain formal quality systems to maintain process control, traceability, and product conformance. Additionally, our facility in Irving, Texas is ISO 13485:2012

certified. We practice continuous improvement initiatives based on routine internal audits as well as external feedback and audits performed by our partners and customers. In addition, we maintain a business continuity management system which focuses on key areas such as contingency planning, security stocks and off-site storage of raw materials and finished goods to ensure continuous supply of our products.

Available Information

We maintain a website with the address www.repligen.com. We are not including the information contained on our website as a part of, or incorporating it by reference into, this Annual Report on Form 10-K. We make available free of charge through our website our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q and Current Reports on Form 8-K, and amendments to these reports, as soon as reasonably practicable after we electronically file such materials with, or furnish such materials to, the Securities and Exchange Commission. Our Code of Business Conduct and Ethics is also available free of charge through our website.

In addition, the public may read and copy any materials that we file with the Securities and Exchange Commission at the Securities and Exchange Commission's Public Reference Room at 100 F Street, NE, Washington, D.C. 20549. The public may obtain information on the operation of the Public Reference Room by calling the Securities and Exchange Commission at 1-800-SEC-0330. Also, our filings with the Securities and Exchange Commission may be accessed through the Securities and Exchange Commission's Electronic Data Gathering, Analysis and Retrieval (EDGAR) system at www.sec.gov.

ITEM 1A. RISK FACTORS

Investors should carefully consider the risk factors described below before making an investment decision.

If any of the events described in the following risk factors occur, our business, financial condition or results of operations could be materially harmed. In that case the trading price of our common stock could decline, and investors may lose all or part of their investment. Additional risks and uncertainties that we are unaware of or that we currently deem immaterial may also become important factors that affect Repligen.

This Annual Report on Form 10-K contains forward looking statements that involve risks and uncertainties. Our actual results could differ materially from those anticipated in these forward looking statements as a result of certain factors, including the risks faced by us described below and elsewhere in this Annual Report on Form 10-K.

We face competition from numerous competitors, most of whom have far greater resources than we have, which may make it more difficult for us to achieve significant market penetration.

The bioprocessing market is intensely competitive, subject to rapid change and significantly affected by new product introductions and other market activities of industry participants.

Many of our competitors are large, well-capitalized companies with significantly more market share and resources than we have. As a consequence, they are able to spend more aggressively on product development, marketing, sales and other product initiatives than we can. Many of these competitors have:

- significantly greater name recognition;
- larger and more established distribution networks;
- additional lines of products and the ability to bundle products to offer higher discounts or other incentives to gain a competitive advantage;
- greater experience in conducting research and development, manufacturing, clinical trials, marketing, obtaining regulatory approval and entering into collaboration or other strategic partnership arrangements; and

- greater financial and human resources for product development, sales and marketing and patent litigation.

Our current competitors, including certain of our customers, or other companies may at any time develop additional products that compete with our products. If any company develops products that compete with or are superior to our products, our revenue may decline. In addition, some of our competitors may compete by lowering the price of their products. If prices were to fall, we may not be able to improve our gross margins or sales growth sufficiently to maintain and grow our profitability.

Despite our increasingly diversified client base, we have historically depended on, and expect to continue to depend on, a limited number of customers for a high percentage of our revenues.

The loss of, or a significant reduction in orders from, any of these customers, including following any termination or failure to renew a long-term supply contract, would significantly reduce our revenues and harm our results of operations. If a large customer purchases fewer of our products, defers orders or fails to place additional orders with us for any other reason, including for business continuity purposes, our revenue could decline, and our operating results may not meet market expectations. In addition, if those customers order our products, but fail to pay on time or at all, our liquidity and operating results could be materially and adversely affected. Furthermore, if any of our current or future products compete with those of any of our largest customers, these customers may place fewer orders with us or cease placing orders with us, which would negatively affect our revenues and operating results.

If we are unable to expand our product portfolio, our ability to generate revenue could be adversely affected.

In connection with the Company's decision to focus our efforts on the growth of our core bioprocessing business, we are increasingly seeking to develop and commercialize our own portfolio of products. Our future financial performance will depend, in part, on our ability to successfully develop and acquire additional bioprocessing products. There is no guarantee that we will be able to successfully acquire or develop additional bioprocessing products, and the Company's financial performance will likely suffer if we are unable to do so.

If intangible assets and goodwill that we recorded in connection with our acquisitions become impaired, we may have to take significant charges against earnings.

In connection with the accounting for our acquisitions of Novozymes, Refine, Atoll, TangenX and Spectrum, we recorded a significant amount of intangible assets, including developed technology and customer relationships relating to the acquired product lines, and goodwill. Under U.S. GAAP, we must assess, at least annually and potentially more frequently, whether the value of intangible assets and goodwill has been impaired. Intangible assets and goodwill will be assessed for impairment in the event of an impairment indicator. Any reduction or impairment of the value of intangible assets and goodwill will result in a charge against earnings, which could materially adversely affect our results of operations and shareholders' equity in future periods.

Spectrum may have unknown liabilities or liabilities which exceed our estimates. Any such liabilities could adversely affect our financial position.

Spectrum's business activities may have associated with them various potential liabilities relating to the conduct of its business prior to the Spectrum Acquisition, including, but not limited to, product liability, historical tax matters and other potential liabilities that could adversely affect our financial position. We have assumed these potential liabilities as of the closing of the Spectrum Acquisition on August 1, 2017. The obligations of Spectrum's former security holders to indemnify us is limited to approximately $36.0 million, subject to limited exceptions. If any liability claims were to arise, we may not be entitled to sufficient, or any, indemnification or recourse from Spectrum's former security holders, which could have a materially adverse impact on our business and results of operations.

Our exposure to political, economic and other risks that arise from operating a multinational business has and may continue to increase.

We operate on a global basis with offices or activities in Japan, South Korea, China, India, Europe and North America. Our operations and sales outside of the U.S. have increased as a result of our acquisitions of Novozymes, Refine, Atoll, TangenX and Spectrum and the continued expansion of our commercial organization. Risks related to these increased foreign operations include:

- fluctuations in foreign currency exchange rates, which may affect the costs incurred in international operations and could harm our results of operations and financial condition;
- changes in general economic and political conditions in countries where we operate, particularly as a result of ongoing economic instability within foreign jurisdictions;
- being subject to complex and restrictive employment and labor laws and regulations, as well as union and works council restrictions;
- changes in tax laws or rulings in the U.S. or other foreign jurisdictions that may have an adverse impact on our effective tax rate;
- being subject to burdensome foreign laws and regulations, including regulations that may place an increased tax burden on our operations;
- being subject to longer payment cycles from customers and experiencing greater difficulties in timely accounts receivable collections; and
- required compliance with a variety of foreign laws and regulations, such as data privacy requirements, real estate and property laws, anti-competition regulations, import and trade restrictions, export requirements, U.S. laws such as the Foreign Corrupt Practices Act, and other U.S. federal laws and regulations established by the office of Foreign Asset Control, local laws such as the U.K. Bribery Act of 2010 or other local laws which prohibit corrupt payments to governmental officials or certain payments or remunerations to customers.

Our business success depends in part on our ability to anticipate and effectively manage these and other related factors. We cannot assure you that these and other related factors will not materially adversely affect our international operations or business as a whole.

In addition, a deterioration in diplomatic relations between the U.S. and any country where we conduct business could adversely affect our future operations and lead to a decline in profitability.

We may be unable to efficiently manage having become a larger and more geographically diverse organization.

Our acquisitions of Novozymes, Refine, Atoll, TangenX and Spectrum, the continued expansion of our commercial sales operations, and our organic growth have increased the scope and complexity of our business. We will face challenges inherent in efficiently managing a more complex business with an increased number of employees over large geographic distances, including the need to implement appropriate systems, policies, benefits and compliance programs. Our inability to manage successfully the geographically more diverse (including from a cultural perspective) and substantially larger combined organization could materially adversely affect our operating results and, as a result, the market price of our common stock.

Our business is subject to a number of environmental risks.

Our manufacturing business involves the controlled use of hazardous materials and chemicals and is therefore subject to numerous environmental and safety laws and regulations and to periodic inspections for possible violations of these laws and regulations. In addition to these hazardous materials and chemicals, our facility in

Sweden also uses Staphylococcus aureus and toxins produced by Staphylococcus aureus in some of its manufacturing processes. Staphylococcus aureus and the toxins it produces, particularly enterotoxins, can cause severe illness in humans. The costs of compliance with environmental and safety laws and regulations are significant. Any violations, even if inadvertent or accidental, of current or future environmental, safety laws or regulations and the cost of compliance with any resulting order or fine could adversely affect our operations.

Our acquisitions expose us to risks that could adversely affect our business, and we may not achieve the anticipated benefits of acquisitions of businesses or technologies.

In addition to our acquisitions of Novozymes, Refine, Atoll, TangenX and Spectrum, and as a part of our growth strategy, we may make selected acquisitions of complementary products and/or businesses. Any acquisition involves numerous risks and operational, financial, and managerial challenges, including the following, any of which could adversely affect our business, financial condition, or results of operations:

- difficulties in integrating new operations, technologies, products, and personnel;
- problems maintaining uniform procedures, controls and policies with respect to our financial accounting systems;
- lack of synergies or the inability to realize expected synergies and cost-savings;
- difficulties in managing geographically dispersed operations, including risks associated with entering foreign markets in which we have no or limited prior experience;
- underperformance of any acquired technology, product, or business relative to our expectations and the price we paid;
- negative near-term impacts on financial results after an acquisition, including acquisition-related earnings charges;
- the potential loss of key employees, customers, and strategic partners of acquired companies;
- claims by terminated employees and shareholders of acquired companies or other third parties related to the transaction;
- the assumption or incurrence of additional debt obligations or expenses, or use of substantial portions of our cash;
- the issuance of equity securities to finance or as consideration for any acquisitions that dilute the ownership of our stockholders;
- the issuance of equity securities to finance or as consideration for any acquisitions may not be an option if the price of our common stock is low or volatile which could preclude us from completing any such acquisitions;
- any collaboration, strategic alliance and licensing arrangement may require us to relinquish valuable rights to our technologies or product candidates, or grant licenses on terms that are not favorable to us;
- diversion of management's attention and company resources from existing operations of the business;
- inconsistencies in standards, controls, procedures, and policies;
- the impairment of intangible assets as a result of technological advancements, or worse-than-expected performance of acquired companies;
- assumption of, or exposure to, historical liabilities of the acquired business, including unknown contingent or similar liabilities that are difficult to identify or accurately quantify; and
- risks associated with acquiring intellectual property, including potential disputes regarding acquired companies' intellectual property.

In addition, the successful integration of acquired businesses requires significant efforts and expense across all operational areas, including sales and marketing, research and development, manufacturing, finance, legal, and information technologies. There can be no assurance that any of the acquisitions we may make will be successful or will be, or will remain, profitable. Our failure to successfully address the foregoing risks may prevent us from achieving the anticipated benefits from any acquisition in a reasonable time frame, or at all.

Servicing our debt will require a significant amount of cash, and we may not have sufficient cash flow from our business to make payments on our debt.

We incurred significant indebtedness in the amount of $115.0 million in aggregate principal with additional accrued interest under our 2.125% Convertible Senior Notes due 2021 (the "Notes"). Our ability to make scheduled payments of the principal of, to pay interest on, or to refinance our indebtedness, including the Notes, depends on our future performance, which is subject to economic, financial, competitive and other factors that may be beyond our control. Our business may not generate cash flow from operations in the future sufficient to service our debt and make necessary capital expenditures. If we are unable to generate such cash flow, we may be required to adopt one or more alternatives, such as selling assets, restructuring debt or obtaining additional equity capital on terms that may be onerous or highly dilutive. Our ability to refinance our indebtedness will depend on the capital markets and our financial condition at such time. In addition, in the event of a fundamental change or a default under the Notes, the holders and/or the trustee under the indentures governing the Notes may accelerate the payment obligations or trigger the holders' repurchase rights under the Notes. We may not be able to engage in any of these activities or engage in these activities on desirable terms, which could result in a default on our debt obligations, including the Notes.

If a make-whole fundamental change, such as an acquisition of our company, occurs prior to the maturity of the Notes, under certain circumstances, the conversion rate for the Notes will increase such that additional shares of our common stock will be issued upon conversion of the Notes in connection with such make-whole fundamental change. The increase in the conversion rate will be determined based on the date on which the make-whole fundamental change occurs or becomes effective and the price paid (or deemed paid) per share of our common stock in such transaction. Upon conversion of the Notes, unless we elect to deliver solely shares of our common stock to settle such conversion (other than paying cash in lieu of delivering any fractional share), we will be required to make cash payments in respect of the Notes being converted. We may not have enough available cash or be able to obtain financing at the time we are required to make repurchases of Notes surrendered therefor or notes being converted. Our failure to repurchase Notes at a time when the repurchase is required by the indenture or to pay any cash payable on future conversions of the Notes as required by the indenture would constitute a default under the indenture. If the repayment of the related indebtedness were to be accelerated after any applicable notice or grace periods, we may not have sufficient funds to repay the indebtedness and repurchase the notes or make cash payments upon conversions thereof.

In addition, our significant indebtedness, combined with our other financial obligations and contractual commitments, could have other important consequences. For example, it could:

- make us more vulnerable to adverse changes in general U.S. and worldwide economic, industry and competitive conditions and adverse changes in government regulation;
- limit our flexibility in planning for, or reacting to, changes in our business and our industry;
- place us at a disadvantage compared to our competitors who have less debt; and
- limit our ability to borrow additional amounts for working capital and other general corporate purposes, including to fund possible acquisitions of, or investments in, complementary businesses, products, services and technologies.

Any of these factors could materially and adversely affect our business, financial condition and results of operations. In addition, if we incur additional indebtedness, the risks related to our business and our ability to service or repay our indebtedness would increase.

Future strategic transactions or acquisitions may require us to seek additional financing, which we may not be able to secure on favorable terms, if at all.

We plan to continue a strategy of growth and development for our bioprocessing business, and we actively evaluate various strategic transactions on an ongoing basis, including licensing or acquiring complementary products, technologies or businesses that would complement our existing portfolio of development programs. In order to complete such strategic transactions, we may need to seek additional financing to fund these investments and acquisitions. Should we need to do so, we may not be able to secure such financing, or obtain such financing on favorable terms because of the volatile nature of the biotechnology marketplace. In addition, future acquisitions may require the issuance or sale of additional equity or debt securities, which may result in additional dilution to our stockholders.

We rely on a limited number of suppliers or, for certain of our products, one supplier, and we may not be able to find replacements or immediately transition to alternative suppliers, which could have a material adverse effect on our financial condition, results of operations and reputation.

There are only a limited number of suppliers of materials related to the XCell ATF System products. An interruption in operations of the business related to these products could occur if we encounter delays or difficulties in securing the required materials, or if we cannot then obtain an acceptable substitute. Any such interruption could significantly affect the business related to these products and our financial condition, results of operations and reputation.

For example, we believe that only a small number of suppliers are currently qualified to supply materials for the XCell ATF System. The use of materials furnished by these replacement suppliers would require us to alter our operations related to the XCell ATF System. Transitioning to a new supplier for our products would be time consuming and expensive, may result in interruptions in our operations, could affect the performance specifications of our product lines or could require that we revalidate the materials. There can be no assurance that we will be able to secure alternative materials, and bring such materials on line and revalidate them without experiencing interruptions in our workflow. If we should encounter delays or difficulties in securing, reconfiguring or revalidating the materials required for our products, our business related to these products and our financial condition, results of operations and reputation could be adversely affected.

As we evolve from a company dependent on others to commercialize our products to a company selling directly to end users, we may encounter difficulties in expanding our product portfolio and our commercial marketing capabilities.

Prior to 2016, we generated most of our revenues through sales of bioprocessing products to a limited number of life sciences companies, such as GE Healthcare, MilliporeSigma and through other individual distributors. However, due in part to our recent strategic acquisitions, an increasing amount of our revenue is attributable to our commercialization of bioprocessing products that we sell directly to end-users such as biopharmaceutical companies and contract manufacturing organizations. This has required and will continue to require us to invest additional resources in our sales and marketing capabilities. We may not be able to attract and retain additional sales and marketing professionals, and the cost of building the sales and marketing function may not generate our anticipated revenue growth. In addition, our sales and marketing efforts may be unsuccessful. Our failure to manage these risks may have a negative impact on our financial condition, or results of operations and may cause our stock price to decline.

If we are unable to obtain or maintain our intellectual property, we may not be able to succeed commercially.

We endeavor to obtain and maintain patent and trade secret protection for our products and processes when available in order to protect them from unauthorized use and to produce a financial return consistent with the significant time and expense required to bring our products to market. Our success will depend, in part, on our ability to:

- obtain and maintain patent protection for our products and manufacturing processes;
- preserve our trade secrets;
- operate without infringing the proprietary rights of third parties; and
- secure any necessary licenses from others on acceptable terms.

We consider trade secrets, know-how and other forms of market protection to be among the most important elements of our proprietary position. We also own or have exclusive rights to a number of U.S. patents and U.S. pending patent applications as well as corresponding foreign patents and patent applications. We cannot be sure that any patent applications relating to our products that we will file in the future or that any currently pending applications will issue on a timely basis, if ever. Since patent applications in the U.S. filed prior to November 2000 are maintained in secrecy until patents issue and since publication of discoveries in the scientific or patent literature often lag behind actual discoveries, we cannot be certain that we were the first to make the inventions covered by each of our pending patent applications or that we were the first to file patent applications for such inventions. Even if patents are issued, the degree of protection afforded by such patents will depend upon the:

- scope of the patent claims;
- validity and enforceability of the claims obtained in such patents; and
- our willingness and financial ability to enforce and/or defend them.

The patent position of life sciences companies is often highly uncertain and usually involves complex legal and scientific questions. Patents which may be granted to us in certain foreign countries may be subject to opposition proceedings brought by third parties or result in suits by us, which may be costly and result in adverse consequences for us.

In some cases, litigation or other proceedings may be necessary to assert claims of infringement, to enforce patents issued to us or our licensors, to protect trade secrets, know-how or other intellectual property rights we own or to determine the scope and validity of the proprietary rights of third parties. Such litigation could result in substantial cost to us and diversion of our resources. An adverse outcome in any such litigation or proceeding could have a material adverse effect on our business, financial condition and results of operations.

If our competitors prepare and file patent applications in the U.S. that claim technology also claimed by us, we may be required to participate in interference proceedings declared by the U.S. Patent and Trademark Office to determine priority of invention, which would result in substantial costs to us.

While one of our U.S. patents covering recombinant Protein A had its term adjusted to expire in 2028, our other U.S. patents covering recombinant Protein A have expired, and as a result, we may face increased competition, which could harm our results of operations, financial condition, cash flow and future prospects.

Other companies could begin manufacturing and selling native or some of the commercial forms of recombinant Protein A in the U.S. and may directly compete with us on certain Protein A products. This may induce us to sell Protein A at lower prices and may erode our market share, which could adversely affect our results of operations, financial condition, cash flow and future prospects.

Our freedom to develop our products may be challenged by others, and we may have to engage in litigation to determine the scope and validity of competitors' patents and proprietary rights, which, if we do not prevail, could harm our business, results of operations, financial condition, cash flow and future prospects.

There has been substantial litigation and other proceedings regarding the complex patent and other intellectual property rights in the life sciences industry. We have been a party to, and in the future may become a party to, patent litigation or other proceedings regarding intellectual property rights.

Other types of situations in which we may become involved in patent litigation or other intellectual property proceedings include:

- We may initiate litigation or other proceedings against third parties to seek to invalidate the patents held by such third parties or to obtain a judgment that our products or services do not infringe such third parties' patents.
- We may initiate litigation or other proceedings against third parties to seek to enforce our patents against infringement.
- If our competitors file patent applications that claim technology also claimed by us, we may participate in interference or opposition proceedings to determine the priority of invention.
- If third parties initiate litigation claiming that our processes or products infringe their patent or other intellectual property rights, we will need to defend against such claims.

The cost to us of any patent litigation or other proceeding, even if resolved in our favor, could be substantial. Some of our competitors may be able to sustain the cost of such litigation or proceedings more effectively than we can because of their substantially greater financial resources. If a patent litigation or other intellectual property proceeding is resolved in a way that is unfavorable to us, we or our collaborative or strategic partners may be enjoined from manufacturing or selling our products and services without a license from the other party and be held liable for significant damages. The failure to obtain any required license on commercially acceptable terms or at all may harm our business, results of operations, financial condition, cash flow and future prospects.

Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could have a material adverse effect on our ability to compete in the marketplace. Patent litigation and other proceedings may also absorb significant management time, attention and resources.

We may become involved in litigation or other proceedings with collaborative partners, which may be time consuming, costly and could result in delays in our development and commercialization efforts.

In connection with the Company's decision to focus its efforts on the growth of its core bioprocessing business, we sought development and commercialization partnerships for our remaining portfolio of clinical stage assets. Any disputes with such partners, such as BioMarin, that lead to litigation or similar proceedings may result in us incurring legal expenses, as well as facing potential legal liability. Such disputes, litigation or other proceedings are also time consuming and may cause delays in our development and commercialization efforts. If we fail to resolve these disputes quickly and with terms that are no less favorable to us than the current terms of the arrangements, our business, results of operations, financial condition, cash flow and future prospects may be harmed.

If we are unable to continue to hire and retain skilled personnel, then we will have trouble developing and marketing our products.

Our success depends largely upon the continued service of our management and scientific staff and our ability to attract retain and motivate highly skilled technical, scientific, management and marketing personnel. We also

face significant competition in the hiring and retention of such personnel from other companies, research and academic institutions, government and other organizations who have superior funding and resources. The loss of key personnel or our inability to hire and retain skilled personnel could materially adversely affect our product development efforts and our business.

The market may not be receptive to our new bioprocessing products upon their introduction.

We expect a portion of our future revenue growth to come from introducing new bioprocessing products, including line extensions and new features for our OPUS disposable chromatography columns, our XCell ATF System, our Sius TFF product line, our Spectrum hollow fiber modules and TFF systems and our growth factors. The commercial success of all of our products will depend upon their acceptance by the life science and biopharmaceutical industries. Many of the bioprocessing products that we are developing are based upon new technologies or approaches. As a result, there can be no assurance that these new products, even if successfully developed and introduced, will be accepted by customers. If customers do not adopt our new products and technologies, our results of operations may suffer and, as a result, the market price of our common stock may decline.

Our products are subject to quality control requirements.

Whether a product is produced by us or purchased from outside suppliers, it is subjected to quality control procedures, including the verification of porosity and with certain products, the complete validation for good manufacturing practices, U.S. Food and Drug Administration, CE and ISO 2001 compliance, prior to final packaging. Quality control is performed by a staff of technicians utilizing calibrated equipment. In the event we, or our manufacturers, produce products that fail to comply with required quality standards, it may incur delays in fulfilling orders, write-downs, damage to our reputation and damages resulting from product liability claims.

If our products do not perform as expected or the reliability of the technology on which our products are based is questioned, we could experience lost revenue, delayed or reduced market acceptance of our products, increased costs and damage to our reputation.

Our success depends on the market's confidence that we can provide reliable, high-quality bioprocessing products. We believe that customers in our target markets are likely to be particularly sensitive to product defects and errors. Our reputation and the public image of our products and technologies may be impaired if our products fail to perform as expected. Although our products are tested prior to shipment, defects or errors could nonetheless occur in our products. Furthermore, the Protein A that we manufacture is subsequently incorporated into products that are sold by other life sciences companies and we have no control over the manufacture and production of those products. In the future, if our products experience, or are perceived to experience, a material defect or error, this could result in loss or delay of revenues, delayed market acceptance, damaged reputation, diversion of development resources, legal claims, increased insurance costs or increased service and warranty costs, any of which could harm our business. Such defects or errors could also narrow the scope of the use of our products, which could hinder our success in the market. Even after any underlying concerns or problems are resolved, any lingering concerns in our target market regarding our technology or any manufacturing defects or performance errors in our products could continue to result in lost revenue, delayed market acceptance, damaged reputation, increased service and warranty costs and claims against us.

If we are unable to manufacture our products in sufficient quantities and in a timely manner, our operating results will be harmed, our ability to generate revenue could be diminished and our gross margin may be negatively impacted.

Our revenues and other operating results will depend in large part on our ability to manufacture and assemble our products in sufficient quantities and in a timely manner. Any interruptions we experience in the manufacturing or shipping of our products could delay our ability to recognize revenues in a particular quarter. Manufacturing

problems can and do arise, and as demand for our products increases, any such problems could have an increasingly significant impact on our operating results. While we have not generally experienced problems with, or delays in, our production capabilities that resulted in delays in our ability to ship finished products, there can be no assurance that we will not encounter such problems in the future. We may not be able to quickly ship products and recognize anticipated revenues for a given period if we experience significant delays in the manufacturing process. In addition, we must maintain sufficient production capacity in order to meet anticipated customer demand, which carries fixed costs that we may not be able to offset if orders slow, which would adversely affect our operating margins. If we are unable to manufacture our products consistently, in sufficient quantities, and on a timely basis, our bioprocessing revenue, gross margins and our other operating results will be materially and adversely affected.

Our operating results may fluctuate significantly, our customers' future purchases are difficult to predict and any failure to meet financial expectations may result in a decline in our stock price.

Our quarterly operating results may fluctuate in the future as a result of many factors such as the impact of seasonal spending patterns, changes in overall spending levels in the life sciences industry, the inability of some of our customers to consummate anticipated purchases of our products due to changes in end-user demand, and other unpredictable factors that may affect ordering patterns. Because our revenue and operating results are difficult to predict, we believe that period-to-period comparisons of our results of operations are not a good indicator of our future performance. Additionally, if revenue declines in a quarter, whether due to a delay in recognizing expected revenue, adverse economic conditions or otherwise, our results of operations will be harmed because many of our expenses are relatively fixed. In particular, a large portion of our manufacturing costs, our research and development, sales and marketing and general and administrative expenses are not significantly affected by variations in revenue. If our quarterly operating results fail to meet investor expectations, the price of our common stock may decline.

Our future revenues pursuant to our asset purchase agreement with BioMarin regarding the HDAC program depend significantly on BioMarin's development and commercialization activities, over which we have no control. If BioMarin is unable or determines not to further develop or commercialize the HDAC program, or experiences significant delays in doing so, we may see a delay in receiving any potential milestone or royalty payments or fail to receive any additional financial benefits from the program.

We entered into an asset purchase agreement with BioMarin on January 21, 2014, related to the histone deacetylase inhibitor ("HDAC") portfolio, which includes the Friedreich's ataxia program. We are dependent on BioMarin for the future success of this development program. We have no control over the conduct and timing of development efforts with respect to the HDAC program. BioMarin's failure to devote sufficient financial and other resources to the development plan may result in the delayed or unsuccessful development of the program, which could lead to the non-payment or delay in payment of milestones under the asset purchase agreement and may preclude or delay commercialization of any product under the HDAC program and any royalties we could receive on future commercial sales. Our future financial results may be harmed if BioMarin does not commercialize the HDAC program successfully or on a timely basis prior to the achievement of any milestones or the payment of any royalties to us.

Health care reform measures could adversely affect our business.

The efforts of governmental and third-party payors to contain or reduce the costs of health care may adversely affect the business and financial condition of pharmaceutical and biotechnology companies, including ours. Specifically, in both the U.S.and some foreign jurisdictions, there have been a number of legislative and regulatory proposals to change the health care system in ways that could affect our ability to sell our products profitably. The U.S. Congress passed the America Affordable Health Choices Act of 2009 and the Patient Protection and Affordable Care Act This Act and other federal and state proposals and health care reforms could limit the prices that can be charged for the products we develop and may limit our commercial opportunity. In the

U.S., the Medicare Prescription Drug, Improvement, and Modernization Act of 2003, also called the Medicare Modernization Act (the "MMA") changed the way Medicare covers and pays for pharmaceutical products. These cost reduction initiatives and other provisions of this legislation could decrease the coverage and price that we receive for any approved products and could seriously harm our business. While the MMA applies only to drug benefits for Medicare beneficiaries, private payors often follow Medicare coverage policy and payment limitations in setting their own reimbursement rates, and any reduction in reimbursement that results from the MMA may result in a similar reduction in payments from private payors. Efforts by the government and other third-party payors to contain or reduce the costs of health care through various means may limit our commercial opportunities and result in a decrease in the price of our common stock or limit our ability to raise capital.

Recent federal government efforts have been aimed at amending or repealing all or portions of existing health care reform legislation, including the Affordable Care Act. Changes in existing health care reform measures may result in uncertainty with respect to legislation, regulation and government policy that could significantly impact our business and the life sciences industry.

Comprehensive tax reform legislation could adversely affect our business and financial condition.

The U.S. government has recently enacted comprehensive tax legislation that includes significant changes to the taxation of business entities. These changes include, among others, a permanent reduction to the corporate income tax rate, limiting interest deductions, allowing for the expensing of capital expenditures, and putting into effect the migration from a "worldwide" system of taxation to a territorial system. The overall impact of this tax reform is uncertain, and it is possible that our business and financial condition could be adversely affected. We continue to examine the impact this tax reform legislation may have on our business.

We compete with life science, pharmaceutical and biotechnology companies who are capable of developing new approaches that could make our products and technology obsolete.

The market for therapeutic and commercial products is intensely competitive, rapidly evolving and subject to rapid technological change. We compete with several medium and small companies in each of our product categories, as well as, several large companies such as GE Healthcare, Pall, MilliporeSigma and Sartorius. These competitors, as well as other life science, pharmaceutical and biotechnology companies may have greater financial, manufacturing, marketing, and research and development resources than we have, as well as stronger name recognition, longer operating histories and benefits derived from greater economies of scale. These factors, among others, may enable our competitors to market their products at lower prices or on terms more advantageous to customers than what we can offer. Competition may result in price reductions, reduced gross margins and loss of market share, any of which could have a material adverse effect on our business, financial condition and results of operations. Additionally, new approaches by these competitors may make our products and technologies obsolete or noncompetitive.

We may become subject to litigation, which could result in substantial costs and divert management's attention and resources from our business.

From time to time, we may become involved in litigation or other legal proceedings relating to claims arising from the ordinary course of business. Litigation is subject to inherent risks and uncertainties that may cause actual results to differ materially from our expectations. If we receive an adverse judgment in any litigation, we could be required to pay substantial damages. With or without merit, litigation can be complex, can extend for a protracted period of time, can be very expensive and the expense can be unpredictable. Litigation initiated by us could also result in counter-claims against us, which could increase the costs associated with the litigation and result in our payment of damages or other judgments against us. In addition, litigation, and any related publicity, may divert the efforts and attention of some of our management and key personnel, which could adversely affect our business.

We may be exposed to liabilities under the Foreign Corrupt Practices Act, and any determination that we violated the Foreign Corrupt Practices Act could have a material adverse effect on our business.

We are subject to the Foreign Corrupt Practice Act (the "FCPA") and other laws that prohibit improper payments or offers of payments to foreign governments and their officials and political parties by U.S. persons and issuers as defined by the statute for the purpose of obtaining or retaining business. We have operations, agreements with third parties and make sales in jurisdictions outside of the U.S., which may experience corruption. Our activities in jurisdictions outside of the U.S. create the risk of unauthorized payments or offers of payments by one of our employees, consultants, sales agents or distributors, because these parties are not always subject to our control. These risks have increased following our recent acquisitions of overseas operations and facilities. It is our policy to implement safeguards to discourage these practices by our employees. However, our existing safeguards and any future improvements may prove to be less than effective, and the employees, consultants, sales agents or distributors of our Company may engage in conduct for which we might be held responsible. Violations of the FCPA may result in severe criminal or civil sanctions, and we may be subject to other liabilities, which could negatively affect our business, operating results and financial condition. In addition, the government may seek to hold us liable for successor liability FCPA violations committed by any companies in which we invest or that we acquire.

Our stock price could be volatile, which could cause shareholders to lose part or all of their investment.

The market price of our common stock, like that of the common stock of many other companies with similar market capitalizations, is highly volatile. In addition, the stock market has experienced extreme price and volume fluctuations. This volatility has significantly affected the market prices of securities of many life sciences, biotechnology and pharmaceutical companies for reasons frequently unrelated to or disproportionate to the operating performance of the specific companies. These broad market fluctuations may adversely affect the market price of our common stock.

Anti-takeover provisions in our charter documents, certain of our contracts with third parties, and under Delaware law could make an acquisition of us, even one that may be beneficial to our stockholders, more difficult and may prevent attempts by our stockholders to replace or remove our current management.

Provisions in our certificate of incorporation and by-laws may delay or prevent an acquisition of us or a change in our management. These provisions include the ability of our board of directors to issue preferred stock without stockholder approval. In addition, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, which limits the ability of stockholders owning in excess of 15% of our outstanding voting stock to merge or combine with us. Although we believe these provisions collectively provide for an opportunity to obtain greater value for stockholders by requiring potential acquirers to negotiate with our board of directors, they would apply even if an offer rejected by our board were considered beneficial by some stockholders. Additionally, certain of our contracts with third parties allow for termination upon specified change of control transactions. Anti-takeover provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors, which is responsible for appointing the members of our management, and anti-takeover or change of control contract termination rights may frustrate or prevent any attempts by a third party to acquire or attempt to acquire the Company.

Changes in accounting standards and subjective assumptions, estimates, and judgments by management related to complex accounting matters could significantly affect our financial results or financial condition.

Generally accepted accounting principles and related accounting pronouncements, implementation guidelines, and interpretations with regard to a wide range of matters that are relevant to our business, such as revenue recognition, asset impairment and fair value determinations, inventories, business combinations and intangible asset valuations, leases, and litigation, are highly complex and involve many subjective assumptions, estimates,

and judgments. Changes in these rules or their interpretation or changes in underlying assumptions, estimates, or judgments could significantly change our reported or expected financial performance or financial condition.

Our results of operations could be negatively affected by potential fluctuations in foreign currency exchange rates.

We conduct a large portion of our business in international markets. For the fiscal year ended December 31, 2017, 23% of our revenues and 24% of our costs and expenses were denominated in foreign currencies, primarily the Swedish Krona, the British pound sterling, and the Euro. We are exposed to the risk of an increase or decrease in the value of the foreign currencies relative to the U.S. Dollar, which could increase the value of our expenses and decrease the value of our revenue when measured in U.S. Dollars. As a result, our results of operation may be influenced by the effects of future exchange rate fluctuations and such effects may have an adverse impact on our common stock price.

Our ability to use net operating loss and tax credit carryforwards and certain built-in losses to reduce future tax payments is limited by provisions of the Internal Revenue Code, and it is possible that certain transactions or a combination of certain transactions may result in material additional limitations on our ability to use our net operating loss and tax credit carryforwards.

Section 382 and 383 of the Internal Revenue Code of 1986, as amended, contain rules that limit the ability of a company that undergoes an ownership change, which is generally any change in ownership of more than 50% of its stock over a three-year period, to utilize its net operating loss and tax credit carryforwards and certain built-in losses recognized in years after the ownership change. These rules generally operate by focusing on ownership changes involving stockholders owning directly or indirectly 5% or more of the stock of a company and any change in ownership arising from a new issuance of stock by the company. Generally, if an ownership change occurs, the yearly taxable income limitation on the use of net operating loss and tax credit carryforwards and certain built-in losses is equal to the product of the applicable long term tax exempt rate and the value of the company's stock immediately before the ownership change. We may be unable to offset our taxable income with losses, or our tax liability with credits, before such losses and credits expire and therefore would incur larger federal income tax liability. While our Section 382 analysis completed during 2017 did not show any current exposure, future transactions or combinations of future transactions may result in a change in control under Section 382 in the future.

If we identify a material weaknesses in our internal control over financial reporting, our ability to meet our reporting obligations and the trading price of our stock could be negatively affected.

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of our annual or interim financial statements will not be prevented or detected on a timely basis. Accordingly, a material weakness increases the risk that the financial information we report contains material errors.

We regularly review and update our internal controls, disclosure controls and procedures, and corporate governance policies. In addition, we are required under the Sarbanes-Oxley Act of 2002 to report annually on our internal control over financial reporting. Any system of internal controls, however well designed and operated, is based in part on certain assumptions and can provide only reasonable, not absolute, assurances that the objectives of the system are met. If we, or our independent registered public accounting firm, determine that our internal controls over financial reporting are not effective, or we discover areas that need improvement in the future, these shortcomings could have an adverse effect on our business and financial results, and the price of our common stock could be negatively affected.

If we cannot conclude that we have effective internal control over our financial reporting, or if our independent registered public accounting firm is unable to provide an unqualified opinion regarding the effectiveness of our internal control over financial reporting, investors could lose confidence in the reliability of our financial statements, which could lead to a decline in our stock price. Failure to comply with reporting requirements could also subject us to sanctions and/or investigations by the SEC, The Nasdaq Stock Market or other regulatory authorities.

If we fail to maintain an effective system of internal controls, we may not be able to accurately report financial results or prevent fraud.

Effective internal controls are necessary to provide reliable financial reports and to assist in the effective prevention of fraud. Any inability to provide reliable financial reports or prevent fraud could harm our business. We must annually evaluate our internal procedures to satisfy the requirements of Section 404 of the Sarbanes-Oxley Act of 2002, which requires management and our independent registered public accounting firm to assess the effectiveness of internal control over financial reporting.

We have previously implemented several significant ERP modules and expect to implement additional ERP modules in the future. The implementation of the ERP system represents a change in our internal control over financial reporting. Although we continue to monitor and assess our internal controls in the new ERP system environment as changes are made and new modules are implemented, and have taken additional steps to modify and enhance the design and effectiveness of our internal control over financial reporting, there is a risk that deficiencies may occur that could constitute significant deficiencies or in the aggregate a material weakness.

If we fail to remedy any deficiencies or maintain the adequacy of our internal controls, we could be subject to regulatory scrutiny, civil or criminal penalties or shareholder litigation. In addition, failure to maintain adequate internal controls could result in financial statements that do not accurately reflect our operating results or financial condition.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

We lease office and manufacturing properties as detailed below:

Location	Square Feet	Principal Use	Lease Expiration
Waltham, Massachusetts	76,000	Corporate headquarters, manufacturing, research and development, marketing and administration offices	May 31, 2023
Marlborough, Massachusetts	64,000	Manufacturing operations	November 30, 2028
Shrewsbury, Massachusetts	12,000	Manufacturing operations	December 31, 2018
Rancho Dominguez, California	54,000	Manufacturing, research and development, marketing and administrative operations	July 15, 2020
Las Vegas, Nevada	30,000	Manufacturing operations	December 31, 2023
Irving, Texas	45,000	Manufacturing operations	December 31, 2026
Houston, Texas	36,500	Manufacturing operations	July 31, 2019
Lund, Sweden	45,000	Manufacturing and administrative operations	December 31, 2021
Ravensburg, Germany	12,300	Manufacturing and administrative operations	June 30, 2022
Bangalore, India	27,000	Sales and distribution center	February 28, 2019
Shanghai, China	2,800	Sales and distribution center	October 14, 2018
Seongnam, Republic of Korea	1,400	Sales and distribution center	May 10, 2019

During the fiscal year ended December 31, 2017, we incurred total rental costs for all facilities of approximately $3,367,000.

In addition to the above, we own certain of our office and manufacturing properties, as detailed below:

Location	Square Feet	Principal Use
Breda, Netherlands	23,000	Sales and distribution center
Shiga, Japan	7,000	Sales and distribution center

ITEM 3. LEGAL PROCEEDINGS

From time to time, we may be subject to legal proceedings and claims in the ordinary course of business. We are not currently aware of any such proceedings or claims that we believe will have, individually or in the aggregate, a material adverse effect on our business, financial condition or results of operations.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Market Information

Our common stock is traded on The Nasdaq Global Market under the symbol "RGEN." The quarterly high and low sales prices for our common stock are shown in the following tables.

	Year Ended December 31, 2017	
	High	Low
First Quarter	$35.61	$28.48
Second Quarter	$46.81	$32.73
Third Quarter	$46.12	$35.73
Fourth Quarter	$40.05	$31.96

	Year Ended December 31, 2016	
	High	Low
First Quarter	$28.85	$20.07
Second Quarter	$28.97	$21.11
Third Quarter	$33.79	$25.93
Fourth Quarter	$34.06	$26.16

Stockholders and Dividends

As of February 15, 2018, there were 381 stockholders of record of our common stock. We have not paid any dividends since our inception and do not intend to pay any dividends on our common stock in the foreseeable future. We anticipate that we will retain all earnings, if any, to support our operations. Any future determination as to the payment of dividends will be at the sole discretion of our Board of Directors and will depend on our financial condition, results of operations, capital requirements and other factors our Board of Directors deems relevant.

Equity Compensation Plan Information

The following table sets forth information as of December 31, 2017 regarding shares of common stock that may be issued under the Company's equity compensation plans, consisting of the Second Amended and Restated 2001 Repligen Corporation Stock Plan, and the Amended and Restated 2012 Stock Option and Incentive Plan.

Plan Category	Number of securities to be issued upon exercise of outstanding options	Weighted-average exercise price of outstanding options	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in first column)
Equity compensation plans approved by security holders	1,240,175[1]	$20.80[2]	1,220,915
Equity compensation plans not approved by security holders	N/A	$ N/A	N/A
Total	1,240,175	$20.80	1,220,915

(1) Includes 734,940 shares of common stock issuable upon the exercise of outstanding options and 505,235 shares of common stock issuable upon the vesting of restricted stock units. No shares of restricted stock are outstanding.

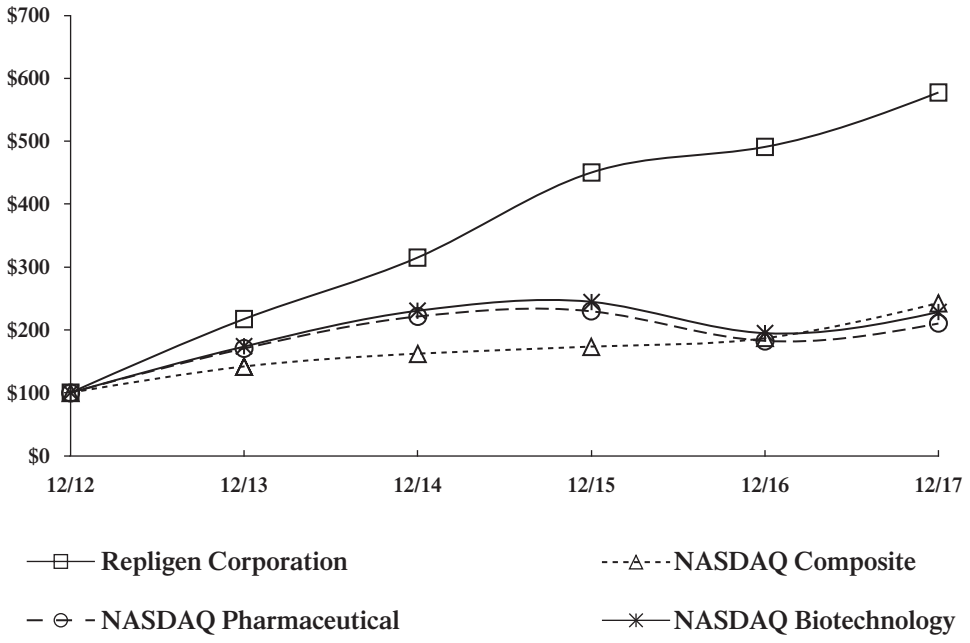
(2) Since restricted stock units do not have any exercise price, such units are not included in the weighted average exercise price calculation.

Issuer Purchases of Equity Securities

In June 2008, the Board of Directors authorized a program to repurchase up to 1.25 million shares of our common stock to be repurchased at the discretion of management from time to time in the open market or through privately negotiated transactions. The repurchase program has no set expiration date and may be suspended or discontinued at any time. We did not repurchase any shares of common stock during the year ended December 31, 2017. In prior years, we repurchased a total of 592,827 shares, leaving 657,173 shares remaining under this authorization.

The graph below matches Repligen Corporation's cumulative 5-year total shareholder return on common stock with the cumulative total returns of the NASDAQ Composite index, the NASDAQ Pharmaceutical index, and the NASDAQ Biotechnology index. The graph tracks the performance of a $100 investment in our common stock and in each index (with the reinvestment of all dividends) from December 31, 2012 to December 31, 2017.

COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN*
Among Repligen Corporation, the NASDAQ Composite Index,
the NASDAQ Pharmaceutical Index and the NASDAQ Biotechnology Index



*$100 invested on 12/31/12 in stock or index, including reinvestment of dividends.
Fiscal year ending December 31.

The information contained in the performance graph shall not be deemed to be "soliciting material" or to be "filed" with the Securities and Exchange Commission, and such information shall not be incorporated by reference into any future filing under the Securities Act of 1933, as amended (the "Securities Act") or the Securities Exchange Act of 1934 (the "Exchange Act"), except to the extent that Repligen specifically incorporates it by reference into such filing.

Recent Sales of Unregistered Securities and Equity Purchases by the Company

In August 2017, we issued 6,153,995 unregistered shares of our common stock valued at $247.6 million as part of the consideration for our acquisition of Spectrum. The issuance is not registered under the Securities Act, in reliance upon the exemption from registration provided by Rule 506(b) of Regulation D.

ITEM 6. SELECTED CONSOLIDATED FINANCIAL DATA

The following selected consolidated financial data are derived from the audited financial statements of Repligen. The selected financial data set forth below should be read in conjunction with our financial statements and the related notes thereto and "Management's Discussion and Analysis of Financial Condition and Results of Operations" included elsewhere in this Annual Report, and in our Annual Reports on Form 10-K for the fiscal years ended December 31, 2016, 2015, 2014 and 2013.

(In thousands, except per share data)	2017[1]	2016	2015[2]	2014	2013
Revenue:					
Product revenue	$141,089	$104,441	$ 83,537	$ 60,431	$ 47,482
Royalty and other revenue	147	100	—	3,117	20,687
Total revenue	141,236	104,541	83,537	63,548	68,169
Operating expenses:					
Cost of product revenue	67,050	47,117	35,251	28,022	22,481
Cost of royalty and other revenue	—	—	—	—	2,682
Research and development	8,672	7,355	5,740	5,609	7,341
Selling, general and administrative	51,509	30,853	24,699	17,154	12,701
Contingent consideration – fair value adjustments	—	3,242	4,083	2,072	91
Total operating expenses	127,231	88,567	69,773	52,857	45,296
Income from operations	14,005	15,974	13,764	10,691	22,873
Investment income	371	346	136	309	301
Interest expense	(6,441)	(3,768)	(32)	(50)	(50)
Other income (expense)	(687)	(860)	(445)	188	(110)
Income before taxes	7,248	11,692	13,423	11,138	23,014
Income tax (benefit) provision	(21,105)	11	4,078	2,968	6,921
Net income (loss)	$ 28,353	$ 11,681	$ 9,345	$ 8,170	$ 16,093
Earnings (loss) per share:					
Basic	$ 0.74	$ 0.35	$ 0.28	$ 0.25	$ 0.51
Diluted	$ 0.72	$ 0.34	$ 0.28	$ 0.25	$ 0.50
Weighted average shares outstanding:					
Basic	38,234	33,573	32,882	32,498	31,667
Diluted	39,150	34,099	33,577	33,264	32,407

	2017	2016	2015	2014	2013
Balance Sheet Data:					
Cash and marketable securities[3]	$173,759	$141,780	$ 73,407	$ 62,003	$ 73,842
Working capital	217,571	163,078	84,471	70,264	75,049
Total assets	743,519	288,913	146,237	128,293	118,645
Long-term obligations	126,760	99,074	4,708	5,879	3,458
Accumulated deficit	(31,508)	(59,861)	(71,542)	(80,887)	(89,057)
Stockholders' equity	591,548	168,764	122,748	111,732	103,886

(1) Includes the full year impact of the acquisition of Atoll GmbH on April 1, 2016 and the acquisition of TangenX Corporation on December 14, 2016.

(2) Includes the full year impact of the acquisition of Refine Technology on June 2, 2014.

(3) Excludes restricted cash of $450,000 as of December 31, 2016, 2015 and 2014 and $200,000 as of December 31, 2013 related to the lease arrangement on our headquarters.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

Repligen and its subsidiaries, collectively doing business as Repligen Corporation ("Repligen", "we", "our", or "the Company") is a leading provider of advanced bioprocessing technology and solutions used in the process of manufacturing biologic drugs. Our products are made to substantially increase biopharmaceutical manufacturing efficiencies and flexibility. As the global biologics market continues to experience strong growth and expansion, our customers – primarily large biopharmaceutical companies and contract manufacturing organizations – face critical production cost, capacity, quality and time pressures that our products are made to address. Our commitment to bioprocessing technology innovation and our expanding product platform can create significant value for our customers by facilitating the manufacturing process for manufacture biologic drugs – monoclonal antibodies, recombinant proteins, vaccines and gene therapies. We are dedicated to "inspiring advances in bioprocessing" as a trusted partner in the production of biologic drugs that improve human health worldwide.

We are a leading OEM manufacturer and supplier of Protein A ligands to life sciences companies. Protein A ligands are the critical "binding" component of Protein A affinity resins that our customers sell to end users (biopharmaceutical manufacturers) for use in downstream purification of monoclonal antibodies. We also manufacture and sell growth factor products used to supplement cell culture media in order to increase cell growth and productivity in a bioreactor.

Our Chromatography products feature pre-packed chromatography columns under our OPUS® brand. OPUS columns, which we deliver to our customers pre-packed with their choice of chromatography resin, are single-campaign ("single-use") disposable columns that replace the use of traditional (more permanent) glass columns used in downstream purification processes. By designing OPUS as an advanced and flexible option for the purification of biologics from process development through clinical-scale and some commercial manufacturing, Repligen has become a leader in pre-packed columns.

Our Filtration products offer a number of advantages to manufacturers of biologic drugs spanning stages from pilot studies to clinical and commercial-scale production. XCell ATF™ systems are used primarily in upstream perfusion ("continuous manufacturing") processes to increase cell concentration and significantly improve biologic product yield from a bioreactor. To address increasing industry demand for "plug-and-play" technology, we developed and in 2016 launched single-use formats of the original stainless steel XCell ATF device. In December 2016, we acquired TangenX Technology Corporation ("TangenX"), balancing our upstream XCell ATF offering with a downstream portfolio of flat-sheet filters and cassettes used in biologic drug purification and formulation processes. The TangenX portfolio includes the single-use Sius™ TFF brand, providing customers with a high-performance, low-cost alternative to reusable TFF products. Most recently, in August 2017, we completed our acquisition of Spectrum. Spectrum brands include the KrosFlo® family of products, ProConnex® disposable flow-path products, TFF systems and others. The Spectrum acquisition significantly strengthened our Filtration product line and diversifies our end markets beyond monoclonal antibodies to include vaccine, recombinant protein and gene therapies.

Customers use our products to produce initial quantities of drug for clinical studies, then scale-up to larger volumes as the drug progresses to commercial production following regulatory approval. Detailed specifications for a drug's manufacturing process are included in the applications that biopharmaceutical companies file for marketing approval with regulators such as the U.S. Food and Drug Administration ("FDA") and the European Medicines Agency ("EMEA"). Once a drug advances to late-stage clinical trials, the manufacturing process is typically locked down by the company, and this process becomes part of the regulatory approval package. As a result, bioprocessing products that are included in these manufacturing specifications can be very "sticky" due to the costs and regulatory uncertainties associated with displacing them.

Critical Accounting Policies and Estimates

While our significant accounting policies are more fully described in the notes to our financial statements, we have identified the policies and estimates below as being critical to our business operations and the understanding of our results of operations. The impact of and any associated risks related to these policies on our business operations are discussed throughout "Management's Discussion and Analysis of Financial Condition," including in the "Results of Operations" section, where such policies affect our reported and expected financial results.

Revenue recognition

Product Sales

We generate revenue from the sale of bioprocessing products, equipment devices, and related consumables used with these equipment devices to customers in the life science and biopharmaceutical industries. On product sales to end customers, revenue is recognized, net of discounts, when both the title and risk of loss have transferred to the customer, as determined by the shipping terms provided there are no uncertainties regarding acceptance, and all obligations have been completed. Generally, our product arrangements for equipment sales are multiple element arrangements, and may include services, such as installation and training, and multiple products, such as consumables and spare parts. In accordance with ASC 605-25, based on terms and conditions of the product arrangements, we believe that these services and undelivered products can be accounted for separately from the delivered product element as the delivered products have value to our customers on a standalone basis. Accordingly, revenue for services not yet performed at the time of product shipment are deferred and recognized as such services are performed. The relative selling price of any undelivered products is also deferred at the time of shipment and recognized as revenue when these products are delivered. For product sales to distributors, we recognize revenue for both equipment and consumables upon delivery to the distributors unless direct shipment to the end user's is requested. In this case, revenue is recognized upon delivery to the end user's location. In general, distributors are responsible for shipment to the end customer along with installation, training and acceptance of the equipment by the end customer. Shipments to distributors are not contingent upon resale of the product. We have had no significant write-offs of uncollectible invoices in the periods presented. We have a few longstanding customers who comprise the majority of revenue and have excellent payment histories and therefore we do not require collateral.

At the time of sale, we also evaluate the need to accrue for warranty and sales returns. The supply agreements we have with our customers and related purchase orders identify the terms and conditions of each sale and the price of the goods ordered. Due to the nature of the sales arrangements, inventory produced for sale is tested for quality specifications prior to shipment. Since the product is manufactured to order and in compliance with required specifications prior to shipment, the likelihood of sales return, warranty or other issues is largely diminished. Furthermore, there is no customer right of return in our sales agreements. Sales returns and warranty issues are infrequent and have not had a material impact on our financial statements historically.

Shipping and handling fees are recorded as a component of product revenue, with the associated costs recorded as a component of cost of product revenue.

BioMarin License Agreement

On January 21, 2014, we out-licensed our histone deacetylase inhibitor ("HDAC") portfolio, which includes the Friedreich's ataxia program, to BioMarin Pharmaceuticals Inc. ("BioMarin"). Under the terms of the agreement, we received an upfront payment of $2 million in January 2014 from BioMarin and a $125,675 payment in September 2014 upon tech transfer, and we have the potential to receive up to $160 million in future milestone payments for the development, regulatory approval and commercial sale of portfolio compounds included in the agreement. In addition, we are eligible to receive royalties on sales of qualified products developed.

Inventories

We value inventory at cost or, if lower, net realizable value, using the first-in, first-out method. We review our inventory at least quarterly and record a provision for excess and obsolete inventory based on our estimates of expected sales volume, production capacity and expiration dates of raw materials, work-in-process and finished products. Expected sales volumes are determined based on supply forecasts provided by key customers for the next three to 12 months. We write down inventory that has become obsolete, inventory that has a cost basis in excess of its expected net realizable value, and inventory in excess of expected requirements to cost of product revenue. Manufacturing of bioprocessing finished goods is done to order and tested for quality specifications prior to shipment.

A change in the estimated timing or amount of demand for our products could result in additional provisions for excess inventory quantities on hand. Any significant unanticipated changes in demand or unexpected quality failures could have a significant impact on the value of inventory and reported operating results. During all periods presented in the accompanying consolidated financial statements, there have been no material adjustments related to a revised estimate of inventory valuations.

Business combinations

Amounts paid for acquisitions are allocated to the assets acquired and liabilities assumed, if any, based on their fair values at the dates of acquisition. The fair value of identifiable intangible assets is based on detailed valuations that use information and assumptions determined by management. Any excess of purchase price over the fair value of the net tangible and intangible assets acquired is allocated to goodwill. The fair value of contingent consideration includes estimates and judgments made by management regarding the probability that future contingent payments will be made, the extent of royalties to be earned in excess of the defined minimum royalties, etc. Management updates these estimates and the related fair value of contingent consideration at each reporting period based on the estimated probability of achieving the earnout targets and applying a discount rate that captures the risk associated with the expected contingent payments. To the extent our estimates change in the future regarding the likelihood of achieving these targets we may need to record material adjustments to our accrued contingent consideration. Changes in the fair value of contingent consideration are recorded in our consolidated statement of operations.

We use the income approach to determine the fair value of certain identifiable intangible assets including customer relationships and developed technology. This approach determines fair value by estimating after-tax cash flows attributable to these assets over their respective useful lives and then discounting these after-tax cash flows back to a present value. We base our assumptions on estimates of future cash flows, expected growth rates, expected trends in technology, etc. We base the discount rates used to arrive at a present value as of the date of acquisition on the time value of money and certain industry-specific risk factors. We believe the estimated purchased customer relationships, developed technologies, trademark / tradename, patents, and in process research and development amounts so determined represent the fair value at the date of acquisition and do not exceed the amount a third party would pay for the assets.

Intangible assets and goodwill

Intangible Assets

We amortize our intangible assets that have finite lives using the straight-line method. Amortization is recorded over the estimated useful lives ranging from 2 to 20 years. We review our intangible assets subject to amortization to determine if any adverse conditions exist or a change in circumstances has occurred that would indicate impairment or a change in the remaining useful life. Further, we also review our indefinite-lived intangible assets not subject to amortization to determine if any adverse conditions exist or a change in circumstances occurred that would indicate an impairment. If the carrying value of an asset exceeds its estimated undiscounted cash flows, we will write-down the carrying value of the intangible asset to its fair value in the

period identified. In assessing fair value, we must make assumptions regarding estimated future cash flows and discount rates. If these estimates or related assumptions change in the future, we may be required to record impairment charges. We generally calculate fair value as the present value of estimated future cash flows to be generated by the asset using a risk-adjusted discount rate. If the estimate of an intangible asset's remaining useful life is changed, we will amortize the remaining carrying value of the intangible asset prospectively over the revised remaining useful life.

Goodwill

We test goodwill for impairment on an annual basis and between annual tests if events and circumstances indicate it is more likely than not that the fair value of a reporting unit is less than its carrying value. Events that would indicate impairment and trigger an interim impairment assessment include, but are not limited to current economic and market conditions, including a decline in market capitalization, a significant adverse change in legal factors, business climate or operational performance of the business, and an adverse action or assessment by a regulator. Our annual impairment test date is the last day of our fiscal year, December 31. While we currently operate as one operating segment, we perform our annual impairment test over each of the Company's two reporting units and concluded that goodwill was not impaired.

Accrued liabilities

We estimate accrued liabilities by identifying services performed on our behalf, estimating the level of service performed and determining the associated cost incurred for such service as of each balance sheet date. For example, we would accrue for professional and consulting fees incurred with law firms, audit and accounting service providers and other third party consultants. These expenses are determined by either requesting those service providers to estimate unbilled services at each reporting date for services incurred or tracking costs incurred by service providers under fixed fee arrangements.

We have processes in place to estimate the appropriate amounts to record for accrued liabilities, which principally involve the applicable personnel reviewing the services provided. In the event that we do not identify certain costs that have begun to be incurred or we under or over-estimate the level of services performed or the costs of such services, the reported expenses for that period may be too low or too high. The date on which certain services commence, the level of services performed on or before a given date, and the cost of such services often require the exercise of judgment. We make these judgments based upon the facts and circumstances known at the date of the financial statements.

A change in the estimated cost or volume of services provided could result in additional accrued liabilities. Any significant unanticipated changes in such estimates could have a significant impact on our accrued liabilities and reported operating results. There have been no material adjustments to our accrued liabilities in any of the periods presented in the accompanying financial statements.

Stock-based compensation

We use the Black-Scholes option pricing model to calculate the fair value of share-based awards on the grant date.

The expected term of options granted represents the period of time for which the options are expected to be outstanding and is derived from our historical stock option exercise experience and option expiration data. For purposes of estimating the expected term, we have aggregated all individual option awards into one group, as we do not expect substantial differences in exercise behavior among our employees. The expected volatility is a measure of the amount by which our stock price is expected to fluctuate during the expected term of options granted. We determined the expected volatility based upon the historical volatility of our common stock over a period commensurate with the option's expected term. The risk-free interest rate is the implied yield available on

U.S. Treasury zero-coupon issues with a remaining term equal to the option's expected term on the grant date. We have never declared or paid any cash dividends on any of our capital stock and do not expect to do so in the foreseeable future. Accordingly, we use an expected dividend yield of zero to calculate the grant-date fair value of a stock option.

We recognize compensation expense on awards that vest based on service conditions on a straight-line basis over the requisite service period based upon the number of options that are ultimately expected to vest, and accordingly, such compensation expense has been adjusted by an amount of estimated forfeitures. We recognize compensation expense on awards that vest based on performance conditions based on our assessment of the probability that the performance condition will be achieved over the service period. Forfeitures represent only the unvested portion of a surrendered option. Forfeitures are estimated at the time of grant and revised, if necessary, in subsequent periods if actual forfeitures differ from those estimates. Based on an analysis of historical data, we have calculated an 8% annual forfeiture rate for non-executive level employees, a 3% annual forfeiture rate for executive level employees, and a 0% forfeiture rate for non-employee members of the Board of Directors, which we believe are reasonable assumptions to estimate forfeitures. However, the estimation of forfeitures requires significant judgment and, to the extent actual results or updated estimates differ from our current estimates, such amounts will be recorded as a cumulative adjustment in the period estimates are revised.

For the fiscal years ended December 31, 2017, 2016 and 2015, we recorded stock-based compensation expense of approximately $6,747,000, $4,595,000 and $3,598,000, respectively, for share-based awards granted under all of the Company's stock plans.

As of December 31, 2017, there was $16,133,000 of total unrecognized compensation cost related to unvested share-based awards. This cost is expected to be recognized over a weighted average remaining requisite service period of 2.52 years. We expect 772,791 unvested options and restricted stock units to vest over the next five years.

Income Taxes

Deferred taxes are determined based on the difference between the financial statement and tax basis of assets and liabilities using enacted tax rates in effect in the years in which the differences are expected to reverse. Valuation allowances are provided, if, based upon the weight of available evidence, it is more likely than not that some or all of the deferred tax assets will not be realized. We account for uncertain tax positions using a "more-likely-than-not" threshold for recognizing and resolving uncertain tax positions. The evaluation of uncertain tax positions is based on factors including, but not limited to, changes in tax law, the measurement of tax positions taken or expected to be taken in tax returns, the effective settlement of matters subject to audit, new audit activity and changes in facts or circumstances related to a tax position. We evaluate our tax position on a quarterly basis. We also accrue for potential interest and penalties related to unrecognized tax benefits in income tax expense.

Results of Operations

The following discussion of the financial condition and results of operations should be read in conjunction with the accompanying consolidated financial statements and the related footnotes thereto.

Revenues

Total revenues for fiscal years 2017, 2016, and 2015 were comprised of the following:

	Years ended December 31,			% Change	
	2017	2016	2015	2017 vs. 2016	2016 vs. 2015
	(in thousands, except percentages)				
Product revenues	$141,089	$104,441	$83,537	35%	25%
Royalty and other revenue	147	100	—	47%	100%
Total revenue	$141,236	$104,541	$83,537	35%	25%

Product revenues

Historically, the majority of our bioprocessing products are sold to customers who incorporate our products into their proprietary antibody purification processes for monoclonal antibodies. These customers then sell their products directly to the pharmaceutical industry. Increasingly, we are selling our products directly to the pharmaceutical industry and its contract manufacturers. These direct sales increased to approximately 62% of our product revenue during fiscal 2017. Sales of our bioprocessing products can be impacted by the timing of large-scale production orders and the regulatory approvals for such antibodies, which may result in significant quarterly fluctuations.

Product revenues were comprised of the following (in thousands):

	December 31, 2017	December 31, 2016	December 31, 2015
Protein products	$ 53,969	$ 54,716	$52,938
Filtration products	49,050[3]	19,774[1]	15,676
Chromatography products	36,309[3]	29,520[2]	14,613
Other	1,761[3]	431	310
Total product revenues	$141,089	$104,441	$83,537

(1) 2016 revenue for filtration products includes revenue related to TangenX from December 14, 2016 through December 31, 2016.

(2) 2016 revenue for chromatography products includes revenue related to Atoll from April 1, 2016 through December 31, 2016.

(3) 2017 revenue for filtration, chromatography and other products includes revenue related to Spectrum from August 1, 2017 through December 31, 2017.

Revenue from protein products includes our Protein A ligands and cell culture growth factors. Revenue from filtration products includes our XCell ATF Systems and consumables, KrosFlo filtration products and Sius filtration products. Revenue from chromatography products includes our OPUS and OPUS PD chromatography columns, chromatography resins and ELISA test kits. Other revenue primarily consists of freight revenues.

For fiscal 2017, product revenues increased by $36,648,000 or 35% as compared to fiscal 2016. The increase in product revenues is due largely to increased volumes in our Filtration and Chromatography products, full year of revenue generated from Atoll and TangenX in 2017, and revenues of $19,394,000 generated from the Spectrum Acquisition in 2017. We sell our various bioprocessing products at different price points. The mix of products sold varies and impacts the fluctuations in total product revenue and cost of product revenues from period to period.

For fiscal 2016, bioprocessing product sales increased by $20,904,000 or 25% as compared to fiscal 2015, due largely to increased volumes in our Filtration and Chromatography products, as well as from revenues generated from the Atoll Acquisition. We sell our various bioprocessing products at different price points. The mix of products sold varies and impacts the fluctuations in total product revenue and cost of product revenues from period to period.

Royalty revenues

Royalty revenues in fiscal 2017 and 2016 relate to royalties received from a third party systems manufacturer associated with our OPUS PD chromatography columns. Royalty revenues are variable and are dependent on sales generated by our partner.

Costs and operating expenses

Total costs and operating expenses for fiscal years 2017, 2016 and 2015 were comprised of the following:

	Years ended December 31,			% Change	
	2017	2016	2015	2017 vs. 2016	2016 vs. 2015
	(in thousands, except percentages)				
Cost of product revenue	$ 67,050	$47,117	$35,251	42%	34%
Research and development	8,672	7,355	5,740	18%	28%
Selling, general and administrative	51,509	30,853	24,699	67%	25%
Contingent consideration – fair value adjustments	—	3,242	4,083	(100%)	(21%)
Total costs and operating expenses	$127,231	$88,567	$69,773	44%	27%

Cost of product revenue

For fiscal 2017, cost of product revenue increased $19,933,000 or 42% as compared to fiscal 2016. This increase is primarily due to the increase in product revenues noted above, the sale of higher cost Spectrum finished goods inventory due to step up to fair value upon acquisition, and costs related to continuing investments in our operations to support future growth. For fiscal 2016, cost of product revenue increased $11,866,000 or 34% as compared to fiscal 2015. This increase is primarily due to the increase in product revenues noted above.

Gross margins were 53%, 55%, and 58% for fiscal 2017, 2016 and 2015, respectively. During fiscal 2017, gross margins declined slightly compared to fiscal 2016 due to product mix, the sale of higher cost Spectrum finished good inventory due to step up to fair value upon acquisition and continuing investments in operations to support future growth. During fiscal 2016, gross margins decreased slightly compared to fiscal 2015 due to product mix and increased investments in operations to support growing demands for the bioprocessing products that we manufacture.

Research and development expenses

During fiscal 2017, 2016 and 2015, research and development expenses were related to bioprocessing products which included personnel, supplies and other research expenses. Due to the small size of the Company and the fact that these various programs share personnel and fixed costs, we do not track all of our expenses or allocate any fixed costs by program, and therefore, have not provided historical costs incurred by project. In addition to the legacy product research and development, the current single-use XCell ATF project incurs expenses related to product development, sterilization, validation testing, and other research related expenses.

For fiscal 2017, research and development expenses increased by $1,317,000 or 18% as compared to fiscal 2016. This increase is related to the increased expenditures related to the continued development of our single-use XCell ATF products and other new products in development, as well as expenses incurred by Spectrum since acquisition.

For fiscal 2016, research and development expenses increased by $1,615,000 or 28% as compared to fiscal 2015. This increase is related to the increased expenditures related to the development of our single-use XCell ATF products, our OPUS resin recovery port, and other new products in development.

We expect our research and development expenses in the year ending December 31, 2018 to increase in order to support new product development.

Selling, general and administrative expenses

Selling, general and administrative ("SG&A") expenses include the costs associated with selling our commercial products and costs required to support our marketing efforts, including legal, accounting, patent, shareholder services, amortization of intangible assets and other administrative functions.

For fiscal 2017, SG&A costs increased by $20,656,000 or 67% as compared to fiscal 2016. This increase is primarily due to costs related to our acquisition of Spectrum, the continuing buildout of our administrative infrastructure to support future growth, the continuing expansion of our customer-facing activities to drive sales of our bioprocessing products, a full year of costs related to Atoll and TangenX and costs incurred by Spectrum since acquisition.

For fiscal 2016, SG&A costs increased by $6,154,000 or 25% as compared to fiscal 2015. This increase is primarily due to the continuing buildout of our administrative infrastructure to support future growth, the continuing expansion of our customer-facing activities to drive sales of our bioprocessing products, costs related to our acquisitions of Atoll and TangenX and expenses incurred by Repligen GmbH (formerly Atoll) post-acquisition.

Contingent Consideration

In fiscal 2016, we recorded contingent consideration expense related primarily to our acquisitions of Refine and Atoll. Contingent consideration related to the Refine Acquisition in 2016 is based on actual 2016 XCell ATF sales and any receipts related to the resolution, withdrawal or settlement of certain patent disputes with a third party to be paid to the former shareholders of Refine. Contingent consideration related to Atoll is based on actual 2016 sales growth compared to 2015 sales. The decrease is attributable to recording Refine contingent consideration fair value adjustments related to projected 2015 and 2016 XCell ATF sales in the previous year, while in 2016 we only recorded fair value adjustments related to 2016 sales. This decrease is partially offset by contingent consideration expense related to our acquisition of Atoll. Because the contingent consideration periods related to our acquisitions of BioFlash, Refine and Atoll all concluded in 2016, we did not incur any contingent consideration expense in fiscal 2017.

Investment income

Investment income for the years ended December 31, 2017, 2016 and 2015 was as follows:

	Years ended December 31,			% Change	
	2017	2016	2015	2017 vs. 2016	2016 vs. 2015
	(in thousands, except percentages)				
Investment income	$371	$346	$136	7%	154%

Investment income includes income earned on invested cash balances. The increase of $25,000 or 7% for fiscal 2017 was primarily due to higher interest rates during 2017 compared to 2016. The increase of $210,000 or 154% for fiscal 2016 was primarily due to higher invested funds following the issuance of our 2.125% Convertible Senior Notes due 2021 (the "Notes") during 2016 compared to 2015. We expect investment income to vary based on changes in the amount of funds invested and fluctuation of interest rates.

Interest expense

Interest expense for the years ended December 31, 2017, 2016 and 2015 was as follows:

	Years ended December 31,			% Change	
	2017	2016	2015	2017 vs. 2016	2016 vs. 2015
	(in thousands, except percentages)				
Interest expense	$6,441	$3,768	$32	70.9%	11,675.0%

Interest expense primarily relates to interest related to our issuance of the Notes in May 2016. The increase of $2,673,000 in fiscal 2017 was due to incurring a full year of interest expense on the Notes in 2017. The increase of $3,736,000 in fiscal 2016 was related to the issuance of the Notes in May 2016.

Other income (expense)

Other income (expense) for the years ended December 31, 2017, 2016 and 2015 was as follows:

	Years ended December 31,			% Change	
	2017	2016	2015	2017 vs. 2016	2016 vs. 2015
	(in thousands, except percentages)				
Other income (expense)	$(687)	$(860)	$(445)	20.1%	(93.3%)

Other income (expense) primarily relates to foreign currency gains (losses) related to amounts due from non-Swedish kronor-based customers and cash balance denominated in U.S. dollars and British pounds held by our Sweden operations.

Provision for income taxes

For the year ended December 31, 2017, we recorded an income tax benefit of ($21,105,000). Our current tax provision of $3,624,000 primarily relates to a foreign tax provision of $3,345,000. Our deferred tax benefit of ($24,729,000) is primarily due to a reduction of the valuation allowance on our deferred tax assets in the amount of $12,164,000 from the sale of certain intellectual property to Repligen Sweden AB during 2017 and taxable temporary differences generated from the Spectrum Acquisition. Additionally, the Company recorded a deferred tax benefit of $12,839,000 resulting from a reduction of the U.S. federal income tax on the Company's net U.S. deferred tax liabilities stemming from new U.S. federal tax legislation passed in December 2017.

The provision for income taxes for the year ended December 31, 2016 totaled $11,000. Our current tax provision of $4,077,000 primarily relates to a foreign tax provision of $4,027,000. Our deferred tax benefit of ($4,066,000) is due to a reduction of the valuation allowance on our deferred tax assets in the amount of $8,535,000 resulting from taxable temporary differences generated from the acquisition of TangenX and the issuance of our convertible senior notes, partially offset by an increase in deferred tax liabilities related to tax amortization of indefinite lived intangibles and the conversion option on our convertible senior notes.

Non-GAAP Financial Measures

We provide non-GAAP adjusted income from operations, non-GAAP adjusted net income and adjusted EBITDA as supplemental measures to GAAP measures regarding our operating performance. These financial measures exclude the impact of certain acquisition related items and, therefore, have not been calculated in accordance with GAAP. A detailed explanation and a reconciliation of each non-GAAP financial measures to its most comparable GAAP financial measures are described below.

We include this financial information because we believe these measures provide a more accurate comparison of our financial results between periods and more accurately reflect how management reviews its financial results. We excluded the impact of certain acquisition related items because we believe that the resulting charges do not accurately reflect the performance of our ongoing operations for the period in which such charges are incurred.

Non-GAAP Adjusted Income from Operations

Non-GAAP adjusted income from operations is measured by taking income from operations as reported in accordance with GAAP and excluding acquisition and integration costs, inventory step-up charges, intangible amortization and contingent consideration expenses booked through our consolidated statements of comprehensive income. The following is a reconciliation of income from operations in accordance with GAAP to non-GAAP adjusted income from operations for the years ended December 31, 2017 and 2016 (in thousands):

	Year ended December 31,	
	2017	2016
GAAP income from operations	$14,005	$15,974
Non-GAAP adjustments to net income:		
Acquisition and integration costs	7,519	2,214
Inventory step-up charges	3,816	59
Intangible amortization	6,215	2,052
Contingent consideration – fair value adjustments	—	3,242
Non-GAAP adjusted income from operations	$31,555	$23,541

Non-GAAP Adjusted Net Income

Non-GAAP adjusted net income is measured by taking net income as reported in accordance with GAAP and excluding acquisition and integration costs and related tax effects, inventory step-up charges, contingent consideration expenses, intangible amortization and related tax effects, non-cash interest expense, the partial release of the valuation allowance on our deferred tax assets and the net impact of tax reform legislation booked through our consolidated statements of comprehensive income. The following is a reconciliation of net income in accordance with GAAP to non-GAAP adjusted net income for the years ended December 31, 2017 and 2016:

	Year Ended December 31,			
	2017		2016	
	Amount (in thousands)	Fully Diluted Earnings per Share	Amount (in thousands)	Fully Diluted Earnings per Share
GAAP net income	$ 28,353	$ 0.72	$11,681	$ 0.34
Non-GAAP adjustments to net income:				
Acquisition costs	7,519	0.19	2,214	0.06
Inventory step-up charges	3,816	0.10	59	0.00
Contingent consideration – fair value adjustments	—	—	3,242	0.10
Intangible amortization	6,215	0.16	2,052	0.06
Non-cash interest expense	3,977	0.10	2,274	0.07
Tax effect of intangible amortization and acquisition costs	(882)	(0.02)	(415)	(0.01)
Release of valuation allowance on deferred tax assets	(12,236)	(0.31)	(4,269)	(0.13)
Net impact of tax reform legislation	(9,586)	(0.24)	—	—
Non-GAAP adjusted net income	$ 27,176	$ 0.69	$16,838	$ 0.49

Note that earnings per share amounts may not add due to rounding.

Adjusted EBITDA

Adjusted EBITDA is measured by taking net income as reported in accordance with GAAP, excluding investment income, interest expense, taxes, depreciation and amortization, and excluding acquisition and integration costs, inventory step-up charges and contingent consideration expenses booked through our consolidated statements of comprehensive income. The following is a reconciliation of net income in accordance with GAAP to adjusted EBITDA for years ended December 31, 2017 and 2016 (in thousands):

	Year ended December 31,	
	2017	**2016**
GAAP net income	$ 28,353	$11,681
Non-GAAP EBITDA adjustments to net income:		
Investment income	(371)	(346)
Interest expense	6,441	3,768
Tax provision	(21,105)	11
Depreciation	4,237	3,269
Amortization	6,215	2,052
EBITDA	23,770	20,435
Other non-GAAP adjustments:		
Acquisition and integration costs	7,519	2,214
Inventory step-up charges	3,816	59
Contingent consideration – fair value adjustments	—	3,242
Adjusted EBITDA	$ 35,105	$25,950

Liquidity and capital resources

We have financed our operations primarily through revenues derived from product sales, research grants, proceeds and royalties from license arrangements, the issuance of the Notes in May 2016 and the issuance of common stock in our July 2017 public offering. Our revenue for the foreseeable future will primarily be limited to our bioprocessing product revenue.

At December 31, 2017, we had cash of $173,759,000 compared to cash and marketable securities of $141,780,000 at December 31, 2016. A deposit for leased office space of $450,000 is classified as restricted cash and is not included in cash and marketable securities totals for December 31, 2016. There were no restrictions on cash for December 31, 2017.

In July 2017, we completed a public offering in which 2,807,017 shares of our common stock were sold to the public at a price of $42.75 per share. The underwriters were granted an option, which they exercised in full, to purchase an additional 421,052 shares of our common stock. The total proceeds from this offering, net of underwriting discounts, commissions and other offering expenses, totaled approximately $129.3 million.

On August 1, 2017, we completed our acquisition of Spectrum for approximately $112.8 million in cash (net of cash received) and 6,153,995 unregistered shares of the Company's common stock.

During the third quarter of 2017, the closing price of the Company's common stock exceeded 130% of the conversion price of the Notes for more than 20 of the last 30 consecutive trading days of the quarter. As a result, the Notes became convertible at the option of the holders of the Notes during the fourth quarter of 2017. Notes with a face value of $11,000 were submitted for conversion in the fourth quarter of 2017; this conversion was settled in the first quarter of 2018. During the fourth quarter of 2017, the closing price of the Company's common stock did not exceed 130% of the conversion price of the Notes for more than 20 of the last 30 consecutive trading days of the quarter. As a result, the Notes are no longer convertible as of December 31, 2017, and the Notes are classified as long term liabilities on the Company's consolidated balance sheet as of

December 31, 2017. It is the Company's policy and intent to settle the face value of the Notes in cash and any excess conversion premium in shares of our common stock.

Cash flows

(In thousands)

Cash provided by (used in)	Year ended December 31, 2017	Increase / (Decrease)	Year ended December 31, 2016	Increase / (Decrease)	Year ended December 31, 2015
Operating activities	$ 17,451	$ 9,930	$ 7,521	$ (7,532)	$15,053
Investing activities	(98,246)	(49,052)	(49,194)	(53,985)	4,791
Financing activities	129,945	17,832	112,113	111,346	767

Operating activities

For fiscal 2017, our operating activities provided cash of $17,451,000, reflecting net income of $28,353,000 offset by net non-cash charges totaling $3,384,000 comprised mainly of depreciation, amortization, stock-based compensation charges and deferred tax benefits. Increases in accounts receivable consumed $6,887,000 of cash, which is based on timing of revenues billed to and payments from customers. Decreases in accounts payable and accrued liabilities consumed $1,186,000 of cash due to timing of payments to vendors.

For fiscal 2016, our operating activities provided cash of $7,521,000 reflecting net income of $11,681,000 and non-cash charges totaling $11,345,000 comprised mainly of depreciation, amortization, stock-based compensation charges, deferred tax benefits and the revaluation of contingent consideration. Increases in accounts receivable and inventories consumed $9,385,000 of cash. Decreases in accounts payable and accrued liabilities consumed $5,840,000 of cash.

For fiscal 2015, our operating activities provided cash of $15,053,000 reflecting net income of $9,345,000 and non-cash charges totaling $12,158,000 including depreciation, amortization, stock-based compensation charges, deferred tax changes and the revaluation of contingent consideration. Increases in accounts payable and long-term liabilities provided an additional $5,139,000 of cash. Increases in accounts receivable, inventories and prepaid expenses and other current assets consumed $10,155,000 of cash. Decreases in accrued liabilities consumed $1,592,000 of cash.

Investing activities

For fiscal 2017, our investing activities consumed $98,246,000 of cash. We used $112,795,000 in cash (net of cash received) for our acquisition of Spectrum. Fixed asset additions consumed $5,454,000, as we continued to increase our manufacturing capacity. Net redemptions of marketable securities provided $19,553,000 of cash in fiscal 2017.

For fiscal 2016, our investing activities consumed $49,194,000 of cash. We used $8,767,000 in cash (net of cash received) for our acquisition of Atoll and $35,847,000 (net of cash received) for our acquisition of TangenX. Fixed asset additions consumed $4,325,000, as we increased the manufacturing capacity of our facilities in the United States and Sweden. Net purchases of marketable securities consumed $300,000 of cash in fiscal 2016.

In fiscal 2015, our investing activities provided $4,791,000 of cash, comprised of $7,419,000 of net redemptions of marketable securities, offset by $2,628,000 of fixed asset additions.

Financing activities

In July 2017, we received net proceeds of $129,309,000 from the issuance of common stock. In May 2016, we received net proceeds of $111,070,000 from the issuance of our senior convertible notes. Exercises of stock

options provided cash receipts of $2,351,000, $1,841,000 and $866,000 in fiscal 2017, 2016 and 2015, respectively. Cash payments to Atoll and Refine in 2017 totaled $5,053,000, of which $1,715,000 related to the fair value of these liabilities as of the respective acquisition dates and is included as part of financing activities. Cash payments to Refine and BioFlash in 2016 totaled $4,105,000, of which $798,000 related to the fair value of these liabilities as of the respective acquisition dates and is included as part of financing activities. Payments to Refine in 2015 related to achieving 2014 sales goals totaled $1,000,000, of which $99,000 related to the fair value of this liability as of the acquisition date and is included as part of financing activities. The remaining amounts are included as an offset to our cash provided by operating activities.

Off-balance sheet arrangements

We do not have any special purpose entities or off-balance sheet financing arrangements.

Contractual obligations

As of December 31, 2017, we had the following fixed obligations and commitments (in thousands):

	Payments Due By Period				
	Total	Less than 1 Year	1 – 3 Years	3 – 5 Years	More than 5 Years
Convertible senior notes	$115,000	$ —	$ —	$115,000	$—
Operating lease obligations	15,071	3,611	6,597	4,442	421
Purchase obligations[1]	15,512	15,512	—	—	—
Total	$145,883	$19,123	$6,597	$119,442	$421

(1) Primarily represents purchase orders for the procurement of raw material for manufacturing.

(2) The table excludes a liability for uncertain tax positions totaling $1,086,000, since we cannot currently make a reliable estimate of the period in which the liability will be payable, if ever. Please see Note 4 to the Notes to our consolidated financial statements.

Capital requirements

Our future capital requirements will depend on many factors, including the following:

- the expansion of our bioprocessing business;
- the ability to sustain sales and profits of our bioprocessing products;
- our ability to acquire additional bioprocessing products;
- our ability to realize value from our outlicensed early stage CNS programs and the RG1068 program;
- the scope of and progress made in our research and development activities;
- the extent of any share repurchase activity; and
- the success of any proposed financing efforts.

Absent acquisitions of additional products, product candidates or intellectual property, we believe our current cash balances are adequate to meet our cash needs for at least the next 24 months. We expect operating expenses in the year ending December 31, 2018 to increase as we continue to expand our bioprocessing business. We expect to incur continued spending related to the development and expansion of our bioprocessing product lines and expansion of our commercial capabilities for the foreseeable future. Our future capital requirements may include, but are not limited to, purchases of property, plant and equipment, the acquisition of additional bioprocessing products and technologies to complement our existing manufacturing capabilities, and continued investment in our intellectual property portfolio.

We plan to continue to invest in our bioprocessing business and in key research and development activities associated with the development of new bioprocessing products. We actively evaluate various strategic transactions on an ongoing basis, including licensing or acquiring complementary products, technologies or businesses that would complement our existing portfolio. We continue to seek to acquire such potential assets that may offer us the best opportunity to create value for our shareholders. In order to acquire such assets, we may need to seek additional financing to fund these investments. If our available cash balances and anticipated cash flow from operations are insufficient to satisfy our liquidity requirements, including because of any such acquisition-related financing needs or lower demand for our products, we may seek to sell common or preferred equity or convertible debt securities, enter into a credit facility or another form of third-party funding, or seek other debt funding. The sale of equity and convertible debt securities may result in dilution to our stockholders, and those securities may have rights senior to those of our common shares. If we raise additional funds through the issuance of preferred stock, convertible debt securities or other debt financing, these securities or other debt could contain covenants that would restrict our operations. Any other third-party funding arrangement could require us to relinquish valuable rights. We may require additional capital beyond our currently anticipated amounts. Additional capital may not be available on reasonable terms, if at all.

Net operating loss carryforwards

At December 31, 2017, we had net operating loss carryforwards of approximately $19,652,000 and business tax credits carryforwards of approximately $396,000 available to reduce future federal income taxes, if any. The net operating loss and business tax credits carryforwards will continue to expire at various dates through December 2037. Net operating loss carryforwards and available tax credits are subject to review and possible adjustment by the Internal Revenue Service, state and foreign jurisdictions and may be limited in the event of certain changes in the ownership interest of significant stockholders.

Foreign earnings

At December 31, 2017, we have not provided for foreign withholding taxes on outside basis differences of foreign subsidiaries of approximately $53,747,000 as we have the ability and intent to indefinitely reinvest the undistributed earnings of our foreign subsidiaries, and there are no needs for such earnings in the U.S. that would contradict our plan to indefinitely reinvest.

Effects of inflation

Our assets are primarily monetary, consisting of cash, cash equivalents and marketable securities. Because of their liquidity, these assets are not directly affected by inflation. Since we intend to retain and continue to use our equipment, furniture and fixtures and leasehold improvements, we believe that the incremental inflation related to replacement costs of such items will not materially affect our operations. However, the rate of inflation affects our expenses, such as those for employee compensation and contract services, which could increase our level of expenses and the rate at which we use our resources.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Interest rate risk

We have historically held investments in commercial paper, U.S. Government and agency securities as well as corporate bonds and other debt securities. As a result, we have been exposed to potential loss from market risks that may occur as a result of changes in interest rates, changes in credit quality of the issuer or otherwise. We do not have any such investments as of December 31, 2017. As a result, a hypothetical 100 basis point increase in interest rates would have no effect on our cash position as of December 31, 2017.

We generally place our marketable security investments in high quality credit instruments, as specified in our investment policy guidelines. We believe that the conservative nature of our investments mitigates our interest rate exposure, and our investment policy limits the amount of our credit exposure to any one issue, issuer (with the exception of U.S. agency obligations) and type of instrument. We do not expect any material loss from our marketable security investments and therefore believe that our potential interest rate exposure is limited.

Foreign exchange risk

The reporting currency of the Company is U.S. dollars, and the functional currency of each of our foreign subsidiaries is its respective local currency. Our foreign currency exposures include the Swedish kronor, Euro, British pound, Chinese yuan, Japanese yen, Singapore dollar, South Korean won and Indian rupee; of these, the primary foreign currency exposures are the Swedish kronor, Euro and British pound. Exchange gains or losses resulting from the translation between the transactional currency and the functional currency are included in net income. Fluctuations in exchange rates may adversely affect our results of operations, financial position and cash flows. We currently do not seek to hedge this exposure to fluctuations in exchange rates.

Although a majority of our contracts are denominated in U.S. dollars, 23% and 40% of total revenues during fiscal 2017 and 2016, respectively, were denominated in foreign currencies while 24% and 22% of our costs and expenses during fiscal 2017 and 2016, respectively, were denominated in foreign currencies, primarily operating expenses associated with cost of revenue, sales and marketing and general and administrative. In addition, 18% and 26% of our consolidated tangible assets were subject to foreign currency exchange fluctuations as of each of December 31, 2017 and 2016, respectively, while 8% and 2% of our consolidated liabilities were exposed to foreign currency exchange fluctuations as of each of December 31, 2017 and 2016, respectively.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

Financial statements and supplementary data required by Item 8 are set forth at the pages indicated in Item 15(a) below and are incorporated herein by reference.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE.

None.

ITEM 9A. CONTROLS AND PROCEDURES

(a) Disclosure Controls and Procedures.

The Company's management, with the participation of our principal executive officer and principal financial officer, has evaluated the effectiveness of the Company's disclosure controls and procedures (as defined in Rules 13a-15(e) or 15d-15(e) under the Exchange Act and as required by paragraph (b) of Rules 13a-15 or 15d-15 under the Exchange Act) as of the end of the period covered by this report. Based on such evaluation, our principal executive officer and principal financial officer have concluded that, as of the end of such period, the Company's disclosure controls and procedures were effective at the reasonable assurance level.

(b) Report of Management on Internal Control Over Financial Reporting.

Management of the Company is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is defined in Rule 13a-15(f) and 15d-15(f) under the Exchange Act as a process designed by, or under the supervision of, the Company's principal executive and principal financial officers 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 and includes those policies and procedures that:

- pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of the assets of the Company;
- provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with 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

- 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.

Management assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2017. In making this assessment, management used the criteria established in *Internal Control – Integrated Framework*, issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (COSO).

Management's assessment of and conclusion on the effectiveness of internal control over financial reporting did not include the internal controls of Spectrum, Inc. (now known as Spectrum LifeSciences, LLC) acquired on August 1, 2017, which are included in the December 31, 2017 consolidated financial statements of Repligen Corporation and constituted $35,641,000 of total assets as of December 31, 2017 and $19,394,000 of revenues for the year then ended.

Subject to the foregoing, based on this assessment, our management concluded that, as of December 31, 2017, our internal control over financial reporting is effective based on those criteria. Ernst & Young LLP, the independent registered public accounting firm that audited our financial statements included in this Annual Report on Form 10-K, has issued an attestation report on our internal control over financial reporting as of December 31, 2017.

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

(c) Attestation Report of the Independent Registered Public Accounting Firm.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of Repligen Corporation:

Opinion on Internal Control over Financial Reporting

We have audited Repligen Corporation's internal control over financial reporting as of December 31, 2017, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Repligen Corporation (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2017, based on the COSO criteria.

As indicated in the accompanying Report of Management on Internal Control Over Financial Reporting, management's assessment of and conclusion on the effectiveness of internal control over financial reporting did not include the internal controls of Spectrum LifeSciences, LLC, which is included in the 2017 consolidated financial statements of the Company and constituted $35,641,000 of total assets as of December 31, 2017 and $19,349,000 of revenues for the year then ended. Our audit of internal control over financial reporting of the Company also did not include an evaluation of the internal control over financial reporting of Spectrum LifeSciences, LLC.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2017 and 2016, the related consolidated statements of operations and comprehensive income, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2017, and the related notes and our reported dated February 22, 2018 expressed an unqualified opinion thereon.

Basis for Opinion

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 Report of Management 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 are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. 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.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (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 its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Ernst & Young LLP

Boston, Massachusetts
February 22, 2018

(d) Changes in Internal Control Over Financial Reporting

We acquired Spectrum in August 2017. The financial results of Spectrum are included in our consolidated financial statements as of December 31, 2017 and for the year then ended and represented approximately $35,641,000 of our total assets as of December 31, 2017 and $19,394,000 of revenues from the date of acquisition through December 31, 2017. As this acquisition occurred during the second half of 2017, the scope of our assessment of our internal control over financial reporting does not include Spectrum. This exclusion is in accordance with the SEC's general guidance that an assessment of a recently acquired business may be omitted from our scope in the year of acquisition.

Except as otherwise described above, there have not been any changes in the Company's internal control over financial reporting (as such term is defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) during the quarter ended December 31, 2017 that have materially affected, or are reasonably likely to materially affect, the Company's internal control over financial reporting.

ITEM 9B. OTHER INFORMATION

None.

PART III

Pursuant to General Instructions G to Form 10-K, the information required for Part III, Items 10, 11, 12, 13 and 14, is incorporated herein by reference from the Company's proxy statement for the 2017 Annual Meeting of Stockholders.

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) (1) *Financial Statements*:

The financial statements required by this item are submitted in a separate section beginning on page 47 of this Report, as follows:

(a) (2) *Financial Statement Schedules*:

None.

(a) (3) *Exhibits*:

The Exhibits which are filed as part of this Annual Report or which are incorporated by reference are set forth in the Exhibit Index hereto.

EXHIBIT INDEX

Exhibit Number	Document Description
2.1	Agreement and Plan of Merger and Reorganization, dated June 22, 2017, by and among Repligen Corporation, Top Hat, Inc., Swing Time, LLC, Spectrum, Inc., and Roy T. Eddleman (filed as Exhibit 2.1 to Repligen Corporation's Current Report on Form 8-K filed on June 23, 2017 and incorporated herein by reference).
3.1	Restated Certificate of Incorporation dated June 30, 1992, as amended September 17, 1999 and May 16, 2014 (filed as Exhibit 3.1 to Repligen Corporation's Quarterly Report on Form 10-Q for the quarter ended September 30, 1999 and incorporated herein by reference) (SEC File No. 000-14656).
3.2	Second Amended and Restated Bylaws (filed as Exhibit 3.1 to Repligen Corporation's Current Report on Form 8-K filed on May 23, 2017 and incorporated herein by reference).
4.1	Specimen Stock Certificate (filed as Exhibit 4.1 to Repligen Corporation's Annual Report on Form 10-K for the year ended March 31, 2002 and incorporated herein by reference) (SEC File No. 000-14656).
4.2	Base Indenture, dated as of May 24, 2016, by and between Repligen Corporation and Wilmington Trust, National Association (filed as Exhibit 4.1 to Repligen Corporation's Current Report on 8-K filed on May 24, 2016).

Exhibit Number	Document Description
4.3	First Supplemental Indenture, dated as of May 24, 2016, by and between Repligen Corporation and Wilmington Trust, National Association (filed as Exhibit 4.2 to Repligen Corporation's Current Report on 8-K filed on May 24, 2016).
4.4	Form of 2.125% Convertible Senior Note due 2012 (included in Exhibit 4.2).
4.5	Stockholder Agreement, dated June 22, 2017, by and between Repligen Corporation and Roy T. Eddleman (filed as Exhibit 10.1 to Repligen Corporation's Current Report on Form 8-K filed on June 23, 2017 and incorporate herein by reference).
10.1*	Repligen Executive Incentive Compensation Plan (filed as Exhibit 10.1 to Repligen Corporation's Current Report on form 8-K filed on December 14, 2005 and incorporated herein by reference).
10.2*	The Second Amended and Restated 2001 Repligen Corporation Stock Plan (filed as Exhibit 10.1 to Repligen Corporation's Current Report on Form 8-K filed on September 18, 2008 and incorporated herein by reference).
10.3.1*	The Amended and Restated 2001 Repligen Corporation Stock Option Plan, Form of Incentive Stock Option Agreement (filed as Exhibit 10.14 to Repligen Corporation's Annual Report on Form 10-K for the year ended March 31, 2005 and incorporated herein by reference).
10.3.2*	The Amended and Restated 2001 Repligen Corporation Stock Plan, Form of Restricted Stock Agreement (filed as Exhibit 10.1 to Repligen Corporation's Current Report on Form 8-K filed on January 9, 2006 and incorporated herein by reference).
10.4	Lease Between Repligen Corporation as Tenant and West Seyon LLC as Landlord, 35 Seyon Street, Waltham, MA (filed as Exhibit 10.1 to Repligen Corporation's Quarterly Report on Form 10-Q for the quarter ended December 31, 2001 and incorporated herein by reference) (SEC File No. 000-14656).
10.5#	Strategic Supplier Alliance Agreement dated January 28, 2010 by and between Repligen Corporation and GE Healthcare Bio-Sciences AB (filed as Exhibit 10.17 to Repligen Corporation's Annual Report on Form 10-K for the year ended March 31, 2010 and incorporated herein by reference).
10.6+	Strategic Supplier Alliance Agreement, by and between GE Healthcare Bio-Sciences AB and Repligen Corporation, dated as of January 28, 2010, as amended on February 23, 2016 (filed as Exhibit 10.1 to Repligen Corporation's Quarterly Report on Form 10-Q for the quarter ended March 31, 2016 and incorporated herein by reference).
10.7+	Strategic Supplier Alliance Agreement – Contract Manufacturing, by and between GE Healthcare Bio-Sciences AB and Repligen Sweden AB (as successor-in-interest to Novozymes Biopharma Sweden AB), dated as of July 7, 2011, as amended on February 23, 2016 (filed as Exhibit 10.2 to Repligen Corporation's Quarterly Report on Form 10-Q for the quarter ended March 31, 2016 and incorporated herein by reference).
10.8	First Amendment to Lease, dated July 5, 2011, by and between Repligen Corporation and TC Saracen, LLC (filed as Exhibit 10.1 to Repligen's Current Report on Form 8-K filed on July 8, 2011 and incorporated herein by reference).
10.9	Lease Between Repligen Sweden AB (as successor-in-interest to Novozymes Biopharma Sweden AB) as Tenant and i-parken i Lund AB as Landlord, St. Lars Vag 47, 220 09 Lund, Sweden (filed as Exhibit 10.18 to Repligen Corporation's Transition Report on Form 10-K for the year ended December 31, 2011 and incorporated herein by reference).
10.10#	Amendment No. 1 to Strategic Supplier Alliance Agreement, by and between GE Healthcare Bio-Sciences AB and Repligen Corporation, dated as of October 27, 2011 (filed as Exhibit 10.19 to Repligen Corporation's Transition Report on Form 10-K for the year ended December 31, 2011 and incorporated herein by reference).

Exhibit Number	Document Description
10.11#	Strategic Supplier Alliance Agreement – Contract Manufacturing, by and between GE Healthcare Bio-Sciences AB and Repligen Sweden AB (as successor-in-interest to Novozymes Biopharma Sweden AB), dated as of July 7, 2011 (filed as Exhibit 10.20 to Repligen Corporation's Transition Report on Form 10-K for the year ended December 31, 2011 and incorporated herein by reference).
10.12#	Amendment to Strategic Supply Alliance Agreement, by and between GE Healthcare Bio-Sciences AB and Repligen Sweden AB (as successor-in-interest to Novozymes Biopharma Sweden AB), dated as of October 27, 2011 (filed as Exhibit 10.21 to Repligen Corporation's Transition Report on Form 10-K for the year ended December 31, 2011 and incorporated herein by reference).
10.13*	Repligen Corporation Amended and Restated 2012 Stock Option and Incentive Plan (filed as Exhibit 99.1 to Repligen Corporation's Form S-8 filed on June 2, 2014 and incorporated herein by reference).
10.14*	Repligen Corporation Non-Employee Directors' Deferred Compensation Plan. (filed as Exhibit 10.16 to Repligen Corporation's Annual Report on Form 10-K for the year ended December 31, 2014 and incorporated by reference)
10.15#	Asset Purchase Agreement, dated January 21, 2014, by and between Repligen Corporation and BioMarin Pharmaceutical Inc. (filed as Exhibit 10.1 to Repligen Corporation's Quarterly Report on Form 10-Q for the quarter ended March 31, 2014 and incorporated herein by reference).
10.16#	Asset Purchase Agreement, dated as of June 2, 2014, by and among Repligen Corporation, Refine Technology, LLC, Jerry Shevitz, certain members of Refine Technology, LLC, Refine Technology Sales LLC, and Refine Technology Sales Asia Pte. Ltd. (filed as Exhibit 10.3 to Repligen Corporation's Quarterly Report on Form 10-Q for the quarter ended June 30, 2014 and incorporated herein by reference).
10.17	Stock Purchase Agreement, dated December 14, 2016, by and among Repligen Corporation, Novasep Process SAS and John Connors (filed as Exhibit 2.1 to Repligen Corporation's Current Report on Form 8-K filed on December 15, 2016 and incorporated herein by reference).
10.18	Fourth Amendment to Lease, dated March 26, 2014, by and between Repligen Corporation and Centerpoint Acquisitions LLC (filed as Exhibit 10.3 to Repligen Corporation's Quarterly Report on Form 10-Q for the quarter ended March 31, 2014 and incorporated herein by reference).
10.19*	Letter Agreement, dated as of April 7, 2014, by and between Repligen Corporation and Tony J. Hunt (filed as Exhibit 10.1 to Repligen Corporation's Current Report on Form 8-K filed on May 6, 2014 and incorporated herein by reference).
10.20*	Letter Agreement, dated as of June 10, 2014, by and between Repligen Corporation and Jon K. Snodgres (filed as Exhibit 10.1 to Repligen Corporation's Current Report on Form 8-K filed on July 15, 2014 and incorporated herein by reference).
10.21*	Employment Agreement, dated as of February 26, 2015, by and between Repligen Corporation and Tony J. Hunt (filed as Exhibit 10.1 to Repligen Corporation's Current Report on Form 8-K/A filed on March 2, 2015 and incorporated herein by reference).
10.22*	Amended and Restated Transitional Services and Separation Agreement, dated August 31, 2016, by and between Repligen and James R. Rusche, Ph.D. (filed as Exhibit 10.1 to Repligen Corporation's Current Report on Form 8-K filed on September 2, 2016 and incorporated herein by reference).
10.23*	Repligen Corporation Amended and Restated Non-Employee Directors' Compensation Policy (filed as Exhibit 10.1 to Repligen Corporation's Quarterly Report on Form 10-Q for the quarter ended June 30, 2015 and incorporated herein by reference).

Exhibit Number	Document Description
10.24	Form of Indemnification Agreement (filed as Exhibit 10.1 to Repligen Corporation's Current Report on Form 8-K filed on May 12, 2016 and incorporated herein by reference).
10.25*	Transitional Services and Separation Agreement, dated as of November 20, 2017, by and between Repligen Corporation and Howard Benjamin (filed as Exhibit 10.1 to Repligen Corporation's Current Report on Form 8-K filed on November 22, 2017 and incorporated herein by reference).
10.26	Lease Agreement, dated February 6, 2018, by and between Repligen Corporation and U.S. REIF 111 Locke Drive Massachusetts, LLC (filed as Exhibit 10.1 to Repligen Corporation's Current Report on Form 8-K filed on February 8, 2018 and incorporated herein by reference).
21.1+	Subsidiaries of the Registrant.
23.1+	Consent of Ernst & Young LLP, Independent Registered Accounting Firm.
24.1+	Power of Attorney (included on signature page).
31.1+	Rule 13a-14(a)/15d-14(a) Certification.
31.2+	Rule 13a-14(a)/15d-14(a) Certification.
32.1+	Certification Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101	The following materials from Repligen Corporation on Form 10-K for the fiscal year ended December 31, 2017, formatted in Extensive Business Reporting Language (XBRL): (i) Consolidated Statements of Operations and Comprehensive Income, (ii) Consolidated Balance Sheets, (iii) Consolidated Statement of Stockholders' Equity, (iv) Consolidated Statements of Cash Flows, and (v) Notes to Consolidated Financial Statements, tagged as blocks of text.

Confidential treatment obtained as to certain portions.
* Management contract or compensatory plan or arrangement.
+ Filed herewith.

The exhibits listed above are not contained in the copy of the Annual Report on Form 10-K distributed to stockholders. Upon the request of any stockholder entitled to vote at the 2015 annual meeting, the Registrant will furnish that person without charge a copy of any exhibits listed above. Requests should be addressed to Repligen Corporation, 41 Seyon Street, Waltham, MA 02453.

ITEM 16. 10-K SUMMARY

We may voluntarily include a summary of information required by Form 10-K under this Item 16. We have elected not to include such summary information.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

REPLIGEN CORPORATION

Date: February 22, 2018

By: /s/ TONY J. HUNT
Tony J. Hunt
President and Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that each person whose signature appears below hereby makes, constitutes and appoints Tony J. Hunt and Jon K. Snodgres with full power to act without the other, his true and lawful attorney-in-fact and agent, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities to sign any or all amendments to this Form 10-K, and to file the same with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorney-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorney-in-fact and agents of any of them, or any substitute or substitutes, lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ TONY J. HUNT **Tony J. Hunt**	President, Chief Executive Officer and Director (Principal executive officer)	February 22, 2018
/s/ JON K. SNODGRES **Jon K. Snodgres**	Chief Financial Officer (Principal financial and accounting officer)	February 22, 2018
/s/ KAREN DAWES **Karen Dawes**	Chairperson of the Board	February 22, 2018
/s/ NICOLAS M. BARTHELEMY **Nicolas M. Barthelemy**	Director	February 22, 2018
/s/ GLENN L. COOPER **Glenn L. Cooper, M.D.**	Director	February 22, 2018
/s/ JOHN G. COX **John G. Cox**	Director	February 22, 2018
/s/ GLENN P. MUIR **Glenn P. Muir**	Director	February 22, 2018
/s/ THOMAS F. RYAN, JR. **Thomas F. Ryan, Jr.**	Director	February 22, 2018

INDEX TO FINANCIAL STATEMENTS

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of Repligen Corporation:

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Repligen Corporation (the Company) as of December 31, 2017 and 2016, and the related consolidated statements of operations and comprehensive income, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2017, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2017 and 2016, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2017, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2017, based on criteria established in Internal Control-Integrated Framework issued by the Committee of the Sponsoring Organizations of the Treadway Commission (2013 framework) and our report dated February 22, 2018 expressed an unqualified opinion thereon.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the US federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2002
Boston, Massachusetts
February 22, 2018

REPLIGEN CORPORATION
CONSOLIDATED BALANCE SHEETS

(in thousands, except share data)	December 31, 2017	December 31, 2016
Assets		
Current assets:		
Cash and cash equivalents	$173,759	$122,233
Marketable securities	—	19,547
Accounts receivable, less reserve for doubtful accounts of $58 and $23, respectively	27,585	15,194
Royalties and other receivables	153	839
Inventories, net	39,004	24,696
Prepaid expenses and other current assets	2,281	1,644
Total current assets	242,782	184,153
Property, plant and equipment, net	22,417	14,956
Intangible assets, net	144,753	29,806
Goodwill	327,333	59,548
Restricted cash	—	450
Other assets	6,234	—
Total assets	$743,519	$288,913
Liabilities and stockholders' equity		
Current liabilities:		
Accounts payable	$ 7,282	$ 5,061
Accrued liabilities	17,929	16,014
Total current liabilities	25,211	21,075
Convertible senior notes, net	99,250	95,272
Deferred tax liabilities	25,167	2,103
Other long-term liabilities	2,343	1,699
Commitments and contingencies (Note 6)		
Stockholders' equity:		
Preferred stock, $.01 par value, 5,000,000 shares authorized, no shares issued or outstanding	—	—
Common stock, $.01 par value, 80,000,000 shares authorized, 43,587,079 shares at December 31, 2017 and 33,844,074 shares at December 31, 2016 issued and outstanding	436	338
Additional paid-in capital	628,983	242,036
Accumulated other comprehensive loss	(6,363)	(13,749)
Accumulated deficit	(31,508)	(59,861)
Total stockholders' equity	591,548	168,764
Total liabilities and stockholders' equity	$743,519	$288,913

The accompanying notes are an integral part of these consolidated financial statements.

REPLIGEN CORPORATION
CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE INCOME

(in thousands, except share and per share data)	Years ended December 31,		
	2017	2016	2015
Revenue:			
Product revenue	$ 141,089	$ 104,441	$ 83,537
Royalty and other revenue	147	100	—
Total revenue	141,236	104,541	83,537
Operating expenses:			
Cost of product revenue	67,050	47,117	35,251
Research and development	8,672	7,355	5,740
Selling, general and administrative	51,509	30,853	24,699
Contingent consideration – fair value adjustments	—	3,242	4,083
Total operating expenses	127,231	88,567	69,773
Income from operations	14,005	15,974	13,764
Investment income	371	346	136
Interest expense	(6,441)	(3,768)	(32)
Other income (expense)	(687)	(860)	(445)
Income before income taxes	7,248	11,692	13,423
Income tax provision (benefit)	(21,105)	11	4,078
Net income	$ 28,353	$ 11,681	$ 9,345
Earnings per share:			
Basic	$ 0.74	$ 0.35	$ 0.28
Diluted	$ 0.72	$ 0.34	$ 0.28
Weighted average shares outstanding:			
Basic	38,233,527	33,572,883	32,881,940
Diluted	39,150,374	34,098,898	33,577,091
Other comprehensive income:			
Unrealized gain (loss) on investments	5	6	22
Foreign currency translation gain (loss)	7,381	(5,189)	(2,815)
Comprehensive income	$ 35,739	$ 6,498	$ 6,552

The accompanying notes are an integral part of these consolidated financial statements.

REPLIGEN CORPORATION
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

(in thousands, except share data)	Common Stock		Additional Paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit	Stockholders' Equity
	Number of Shares	Amount				
Balance, December 31, 2014	32,774,374	$328	$198,064	$ (5,773)	$(80,887)	$111,732
Net income					9,345	9,345
Unrealized gain on investments				22		22
Foreign currency translation adjustment, net				(2,815)		(2,815)
Share-based compensation expense			3,598			3,598
Exercise of stock options and vesting of restricted stock	174,979	1	865			866
Balance, December 31, 2015	32,949,353	$329	$202,527	$ (8,566)	$(71,542)	$122,748
Net income					11,681	11,681
Unrealized gain on investments				6		6
Shares issued in acquisition	538,700	5	14,130			14,135
Payment of contingent consideration in stock	34,803	—	875			875
Conversion option of convertible notes, net of issuance costs of $639,000			18,072			18,072
Foreign currency translation adjustment, net				(5,189)		(5,189)
Share-based compensation expense			4,595			4,595
Exercise of stock options and vesting of restricted stock	321,218	4	1,837			1,841
Balance, December 31, 2016	33,844,074	$338	$242,036	$(13,749)	$(59,861)	$168,764
Net income					28,353	28,353
Unrealized gain on investments				5		5
Shares issued in acquisition	6,153,995	62	247,513			247,575
Payment of contingent consideration in stock	30,756	1	1,062			1,063
Proceeds from issuance of common stock, net of issuance costs of $8,691,000	3,228,069	32	129,277			129,309
Foreign currency translation adjustment, net				7,381		7,381
Share-based compensation expense			6,747			6,747
Exercise of stock options and vesting of restricted stock	330,185	3	2,348			2,351
Balance, December 31, 2017	43,587,079	$436	$628,983	$ (6,363)	$(31,508)	$591,548

The accompanying notes are an integral part of these consolidated financial statements.

REPLIGEN CORPORATION
CONSOLIDATED STATEMENTS OF CASH FLOWS

(In thousands)	Years ended December 31,		
	2017	2016	2015
Cash flows from operating activities:			
Net income:	$ 28,353	$ 11,681	$ 9,345
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	10,507	5,334	4,594
Non-cash interest expense	3,977	2,274	—
Stock-based compensation expense	6,747	4,595	3,598
Deferred tax benefit	(24,679)	(4,092)	(118)
Loss on revaluation of contingent consideration	—	3,242	4,083
Gain on sale of fixed assets	—	(15)	—
Loss on disposal of assets	64	7	1
Changes in assets and liabilities:			
Accounts receivable	(6,888)	(3,222)	(3,729)
Royalties and other receivables	644	(652)	158
Inventories	605	(6,163)	(6,149)
Prepaid expenses and other assets	(1,304)	612	(277)
Accounts payable	807	(1,802)	3,024
Accrued liabilities	(1,993)	(4,038)	(1,592)
Long-term liabilities	611	(240)	2,115
Net cash provided by operating activities	17,451	7,521	15,053
Cash flows from investing activities:			
Purchases of marketable securities	(47)	(23,700)	(20,168)
Redemptions of marketable securities	19,600	23,400	27,587
Acquisition of assets of Spectrum, Inc., net of cash acquired	(112,795)	—	—
Acquisition of assets of Atoll GmbH, net of cash acquired	—	(8,767)	—
Acquisition of assets of TangenX Technology Corporation, net of cash acquired	—	(35,847)	—
Decrease of restricted cash	450	—	—
Proceeds from sale of fixed assets	—	45	—
Purchases of property, plant and equipment	(5,454)	(4,325)	(2,628)
Net cash provided by (used in) investing activities	(98,246)	(49,194)	4,791
Cash flows from financing activities:			
Proceeds from issuance of senior convertible notes, net of issuance costs	—	111,070	—
Proceeds from issuance of common stock, net of issuance costs	129,309	—	—
Exercise of stock options	2,351	1,841	866
Payments of contingent consideration	(1,715)	(798)	(99)
Net cash provided by financing activities	129,945	112,113	767
Effect of exchange rate changes on cash and cash equivalents	2,376	(2,299)	(1,882)
Net increase (decrease) in cash and cash equivalents	51,526	68,141	18,729
Cash and cash equivalents, beginning of period	122,233	54,092	35,363
Cash and cash equivalents, end of period	$ 173,759	$122,233	$ 54,092
Supplemental information:			
Income taxes paid	$ 4,021	$ 3,993	$ 4,948
Interest paid	$ 2,444	$ 1,222	$ —
Payment of contingent consideration in common stock	$ 1,063	$ 875	$ —
Common stock tendered for acquisition of Spectrum, Inc.	$ 247,575	$ —	$ —
Common stock tendered for acquisition of Atoll GmbH	$ —	$ 14,135	$ —

	Years ended December 31,		
	2017	2016	2015
Business Acquisitions:			
Fair value of tangible assets acquired	$ 19,709	$ 1,420	$ —
Fair value of accounts receivable	5,075	1,267	—
Fair value of other assets	1,718	183	—
Liabilities assumed	(7,698)	(3,662)	—
Fair value of stock issued	(247,575)	(14,135)	—
Cost in excess of fair value of assets acquired (Goodwill)	265,519	46,505	—
Acquired identifiable intangible assets	120,080	19,829	—
Deferred tax liabilities, net	(43,608)	(5,841)	—
	113,220	45,566	—
Less accrued contingent consideration	—	(952)	—
Less working capital adjustment	(425)	—	—
Net cash paid for business acquisitions	$ 112,795	$ 44,614	$ —

The accompanying notes are an integral part of these consolidated financial statements.

REPLIGEN CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Organization and Nature of Business

Repligen Corporation (NASDAQ:RGEN) is a bioprocessing company focused on the development, manufacture and commercialization of highly innovative products used to improve the interconnected phases of the biological drug manufacturing process. The Company's portfolio includes protein products (Protein A affinity ligands, cell culture growth factors), chromatography products (OPUS pre-packed columns, chromatography resins, ELISA kits), and filtration products (XCell ATF Systems, Sius TFF cassettes, KrosFlo filters, modules and systems). The Company's bioprocessing products are sold to major life sciences companies, biopharmaceutical development companies and contract manufacturing organizations worldwide. The Protein A ligands and growth factor products that the Company manufactures are components of chromatography resins and cell culture media, respectively.

The Company is the leading manufacturer of Protein A ligands, a critical component of Protein A resins that are the industry standard for downstream separation and purification of monoclonal antibody-based therapeutics. The Company's growth factors are used in upstream processes to accelerate cell growth and productivity in a bioreactor. The Company's innovative line of OPUS chromatography columns, used in downstream processes for bench-scale through clinical-scale purification needs, are delivered pre-packed with its customers' choice of resin and volume. The Company's XCell ATF Systems, available in stainless steel and single-use configurations, continuously eliminate waste from a bioreactor, to accelerate and increase productivity in upstream processes. Single-use Sius TFF cassettes and hardware are used for biologic drug concentration in downstream processes. KrosFlo filters and systems are used in the filtration, isolation, purification and concentration of biologics. Repligen's corporate headquarters are in Waltham, Massachusetts (USA) and its manufacturing facilities are located in Waltham, Massachusetts; Shrewsbury, Massachusetts; Rancho Dominguez, California; Las Vegas, Nevada; Houston, Texas; Irving, Texas; Lund, Sweden; and Weingarten, Germany.

The Company is subject to a number of risks typically associated with companies in the biotechnology industry. These risks principally include the Company's dependence on key customers, development by the Company or its competitors of new technological innovations, dependence on key personnel, protection of proprietary technology, compliance with the FDA and other governmental regulations and approval requirements, as well as the ability to grow the Company's business and obtain adequate funding to finance this growth.

2. Summary of Significant Accounting Policies

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States ("GAAP") requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting periods.

Significant estimates and assumptions by management affect the Company's revenue recognition for multiple element arrangements, allowance for doubtful accounts, the net realizable value of inventory, estimated fair value of cost method investments, valuations and purchase price allocations related to business combinations, expected future cash flows including growth rates, discount rates, terminal values and other assumptions and estimates used to evaluate the recoverability of long-lived assets, estimated fair values of intangible assets and goodwill, amortization methods and periods, warranty reserves, certain accrued expenses, stock-based compensation, fair value estimates of contingent consideration, contingent liabilities, tax reserves and recoverability of the Company's net deferred tax assets and related valuation allowance.

Although the Company regularly assesses these estimates, actual results could differ materially from these estimates. Changes in estimates are recorded in the period in which they become known. The Company bases its estimates on historical experience and various other assumptions that it believes to be reasonable under the circumstances.

Consolidation

The consolidated financial statements include the accounts of the Company and its wholly-owned subsidiaries, Repligen Sweden AB, Repligen GmbH, Spectrum LifeSciences LLC and its subsidiaries ("Spectrum," acquired on August 1, 2017), TangenX Technology Corporation ("TangenX," acquired on December 14, 2016 and merged into and with the Company as of June 30, 2017) and Repligen Singapore Pte. Ltd. All significant intercompany accounts and transactions have been eliminated in consolidation.

Foreign Currency

The Company translates the assets and liabilities of its foreign subsidiary at rates in effect at the end of the reporting period. Revenues and expenses are translated at average rates in effect during the reporting period. Translation adjustments, including adjustments related to the Company's intercompany loan with Repligen Sweden and Repligen Sweden's intercompany loan with Repligen GmbH, are remeasured at each period end and included in accumulated other comprehensive income.

Revenue Recognition

Product Sales

The Company's revenue recognition policy is to recognize revenues from product sales and services in accordance with ASC 605, Revenue Recognition. These standards require that revenues are recognized when persuasive evidence of an arrangement exists, product delivery, including customer acceptance, has occurred or services have been rendered, the price is fixed or determinable and collectability is reasonably assured. Determination of whether these criteria have been met are based on management's judgments primarily regarding the fixed nature of the fee charged for the product delivered and the collectability of those fees. The Company has a few longstanding customers who comprise the majority of revenue and have excellent payment histories and therefore the Company does not require collateral. The Company has had no significant write-offs of uncollectible invoices in the periods presented. When more than one element such as equipment, consumables, and services are contained in a single arrangement, the Company allocates revenue between the elements based on each element's relative selling price, provided that each element meets the criteria for treatment as a separate unit of accounting. An item is considered a separate unit of accounting if it has value to the customer on a stand-alone basis. The selling price of the undelivered elements is determined by the price charged when the element is sold separately, or in cases when the item is not sold separately, by third-party evidence of selling price or management's best estimate of selling price.

The Company's product revenues are from the sale of bioprocessing products, equipment devices, and related consumables used with these equipment devices to customers in the life science and biopharmaceutical industries. On product sales to end customers, revenue is recognized, net of discounts, when both the title and risk of loss have transferred to the customer, as determined by the shipping terms provided there are no uncertainties regarding acceptance, and all obligations have been completed. Generally, our product arrangements for equipment sales are multiple element arrangements, and may include services, such as installation and training, and multiple products, such as consumables and spare parts. In accordance with ASC 605-25, based on terms and conditions of the product arrangements, the Company believes that these services and undelivered products can be accounted for separately from the delivered product element as the delivered products have value to our customers on a standalone basis. Accordingly, revenue for services not yet performed at the time of product shipment are deferred and recognized as such services are performed. The relative selling

price of any undelivered products is also deferred at the time of shipment and recognized as revenue when these products are delivered. For product sales to distributors, the Company recognizes revenue for both equipment and consumables upon delivery to the distributor unless direct shipment to the end user is requested. In this case, revenue is recognized upon delivery to the end user's location. In general, distributors are responsible for shipment to the end customer along with installation, training and acceptance of the equipment by the end customer. Sales to distributors are not contingent upon resale of the product.

At the time of sale, the Company also evaluates the need to accrue for warranty and sales returns. The supply agreements the Company has with its customers and the related purchase orders identify the terms and conditions of each sale and the price of the goods ordered. Due to the nature of the sales arrangements, inventory produced for sale is tested for quality specifications prior to shipment. Since the product is manufactured to order and in compliance with required specifications prior to shipment, the likelihood of sales return, warranty or other issues is largely diminished. Furthermore, there is no customer right of return in our sales agreements. Sales returns and warranty issues are infrequent and have not had a material impact on the Company's financial statements historically.

Shipping and handling fees are recorded as a component of product revenue, with the associated costs recorded as a component of cost of product revenue.

Sale of Intellectual Property to BioMarin

In January 2014, the Company entered into an asset purchase agreement (the "Asset Purchase Agreement") with BioMarin Pharmaceutical Inc. ("BioMarin") to sell Repligen's histone deacetylase inhibitor (HDACi) portfolio. The Company is entitled to receive up to $160 million in potential future milestone payments for the development, regulatory approval and commercial sale of portfolio compounds included in the agreement. These potential milestone payments are approximately 37% related to clinical development and 63% related to initial commercial sales in specific geographies. In addition, Repligen is eligible to receive royalties on sales of therapeutic products originating from the HDACi portfolio. The royalty rates are tiered and begin in the mid-single-digits for the first HDACi portfolio product and for the first non-HDACi portfolio product with lesser amounts for any backup products developed under the Asset Purchase Agreement. Repligen's receipt of these royalties is subject to customary offsets and deductions. There are no refund provisions in this agreement. Any milestones earned upon specified clinical development or commercial sales events or future royalty payments, under the Asset Purchase Agreement will be recognized as revenue when they are earned.

Risks and Uncertainties

The Company evaluates its operations periodically to determine if any risks and uncertainties exist that could impact its operations in the near term. The Company does not believe that there are any significant risks which have not already been disclosed in the consolidated financial statements. A loss of certain suppliers could temporarily disrupt operations, although alternate sources of supply exist for these items. The Company has mitigated these risks by working closely with key suppliers, identifying alternate sources and developing contingency plans.

Cash, Cash Equivalents and Marketable Securities

At December 31, 2016, the Company's investments included money market funds and short-term marketable securities. There were no such investments as of December 31, 2017. Short-term marketable securities are investments with original maturities of greater than 90 days. Long-term marketable securities are securities with maturities of greater than one year at the original date of purchase.

Investments in debt securities consisted of the following at December 31, 2016 (in thousands):

	Amortized Cost	Gross Unrealized Gain	Gross Unrealized Loss	Fair Value
Marketable securities:				
U.S. Government and agency securities	$ 807	$—	$—	$ 807
Corporate and other debt securities	18,745	2	(7)	18,740
Total	$19,552	$ 2	$ (7)	$19,547

There were no long-term marketable securities as of December 31, 2016.

There were no realized gains or losses on the investments for the fiscal years ended December 31, 2017, 2016 and 2015.

Fair Value Measurement

In determining the fair value of its assets and liabilities, the Company uses various valuation approaches. The Company employs a hierarchy for inputs used in measuring fair value that maximizes the use of observable inputs and minimizes the use of unobservable inputs by requiring that observable inputs be used when available. Observable inputs are inputs that market participants would use in pricing the asset or liability based on market data obtained from sources independent of the Company. Unobservable inputs are inputs that reflect the Company's assumptions about the inputs that market participants would use in pricing the asset or liability and are developed based on the best information available in the circumstances. The fair value hierarchy is broken down into three levels based on the source of inputs as follows:

Level 1 – Valuations based on unadjusted quoted prices in active markets for identical assets or liabilities that the Company has the ability to access.

Level 2 – Valuations based on quoted prices for similar assets or liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active and models for which all significant inputs are observable, either directly or indirectly.

Level 3 – Valuations based on inputs that are unobservable and significant to the overall fair value measurement.

The availability of observable inputs can vary among the various types of financial assets and liabilities. To the extent that the valuation is based on models or inputs that are less observable or unobservable in the market, the determination of fair value requires more judgment. In certain cases, the inputs used to measure fair value may fall into different levels of the fair value hierarchy. In such cases, for financial statement disclosure purposes, the level in the fair value hierarchy within which the fair value measurement is categorized is based on the lowest level input that is significant to the overall fair value measurement.

The Company's fixed income investments were historically comprised of obligations of U.S. government agencies, corporate debt securities and other interest bearing securities. These investments have been initially valued at the transaction price and subsequently valued, at the end of each reporting period, utilizing third party pricing services or other market observable data. The pricing services utilize industry standard valuation models, including both income and market based approaches and observable market inputs to determine value. These observable market inputs include reportable trades, benchmark yields, credit spreads, broker/dealer quotes, bids, offers, current spot rates and other industry and economic events. The Company validates the prices provided by third party pricing services by reviewing their pricing methods and matrices, obtaining market values from other pricing sources, analyzing pricing data in certain instances and confirming that the relevant markets are active. After completing its validation procedures, the Company did not adjust or override any fair value measurements provided by the pricing services as of December 31, 2017.

As of December 31, 2017, the Company had no assets or liabilities for which fair value measurement is either required or has been elected to be applied.

As of December 31, 2016, the Company had accrued liabilities with a fair value of $6,119,000 related to contingent consideration in connection with the Refine and Atoll business combinations. The contingent consideration related to Refine was based on actual 2016 revenues. The contingent consideration related to Atoll was based on meeting revenue growth targets in 2016. These valuations were Level 3 valuations, as the primary inputs are unobservable. All contingent consideration liabilities were paid in the first quarter of 2017.

The following table provides a rollforward of the fair value of contingent consideration (in thousands):

Balance at December 31, 2016	$ 6,119
Payments	(6,119)
Balance at December 31, 2017	$ —

In May 2016, the Company issued $115 million aggregate principal amount of the Notes due June 1, 2021. Interest is payable semi-annually in arrears on June 1 and December 1 of each year, beginning on December 1, 2016. As of December 31, 2017, the carrying value of the Notes was $99.3 million, net of unamortized discount, and the fair value of the Notes was approximately $149.5 million. The fair value of the Notes is a Level 1 valuation and was determined based on the most recent trade activity of the Notes as of December 31, 2017. The Notes are discussed in more detail in Note 10, “Convertible Senior Notes.”

There were no remeasurements to fair value during the year ended December 31, 2017 of financial assets and liabilities that are not measured at fair value on a recurring basis.

Inventories

Inventories relate to the Company’s bioprocessing business. The Company values inventory at cost or, if lower, net realizable value, using the first-in, first-out method. The Company reviews its inventories at least quarterly and records a provision for excess and obsolete inventory based on its estimates of expected sales volume, production capacity and expiration dates of raw materials, work-in-process and finished products. Expected sales volumes are determined based on supply forecasts provided by key customers for the next 3 to 12 months. The Company writes down inventory that has become obsolete, inventory that has a cost basis in excess of its expected net realizable value, and inventory in excess of expected requirements to cost of product revenue. Manufacturing of bioprocessing finished goods is done to order and tested for quality specifications prior to shipment. Reserves for excess and obsolete inventory were $455,000 and $435,000 as of December 31, 2017 and 2016, respectively. The reserve balance at December 31, 2017 and 2016 is sufficient to cover excess or obsolete inventory for the consolidated Company.

A change in the estimated timing or amount of demand for the Company’s products could result in additional provisions for excess inventory quantities on hand. Any significant unanticipated changes in demand or unexpected quality failures could have a significant impact on the value of inventory and reported operating results. During all periods presented in the accompanying financial statements, there have been no material adjustments related to a revised estimate of inventory valuations.

Work-in-process and finished products inventories consist of material, labor, outside processing costs and manufacturing overhead.

Inventories consist of the following (in thousands):

	December 31, 2017	December 31, 2016
Raw Materials	$22,351	$14,954
Work-in-process	4,083	2,789
Finished products	12,570	6,953
Total	$39,004	$24,696

Accrued Liabilities

The Company estimates accrued liabilities by identifying services performed on the Company's behalf, estimating the level of service performed and determining the associated cost incurred for such service as of each balance sheet date. For example, the Company would accrue for professional and consulting fees incurred with law firms, audit and accounting service providers and other third party consultants. These expenses are determined by either requesting those service providers to estimate unbilled services at each reporting date for services incurred or tracking costs incurred by service providers under fixed fee arrangements.

The Company has processes in place to estimate the appropriate amounts to record for accrued liabilities, which principally involve the applicable personnel reviewing the services provided. In the event that the Company does not identify certain costs that have begun to be incurred or the Company under or over-estimates the level of services performed or the costs of such services, the reported expenses for that period may be too low or too high. The date on which certain services commence, the level of services performed on or before a given date, and the cost of such services often require the exercise of judgment. The Company makes these judgments based upon the facts and circumstances known at the date of the financial statements.

Income Taxes

Deferred taxes are determined based on the difference between the financial statement and tax basis of assets and liabilities using enacted tax rates in effect in the years in which the differences are expected to reverse. Valuation allowances are provided, if, based upon the weight of available evidence, it is more likely than not that some or all of the deferred tax assets will not be realized. The Company accounts for uncertain tax positions using a "more-likely-than-not" threshold for recognizing and resolving uncertain tax positions. The evaluation of uncertain tax positions is based on factors including, but not limited to, changes in tax law, the measurement of tax positions taken or expected to be taken in tax returns, the effective settlement of matters subject to audit, new audit activity and changes in facts or circumstances related to a tax position. The Company evaluates this tax position on a quarterly basis. The Company also accrues for potential interest and penalties related to unrecognized tax benefits in income tax expense.

Property, Plant & Equipment

Property, Plant & Equipment is recorded at cost less allowances for depreciation. Depreciation is calculated using the straight-line method over the estimated useful life of the asset as follows:

Classification	Estimated Useful Life
Buildings	Thirty years
Leasehold improvements	Shorter of the term of the lease or estimated useful life
Equipment	Three to twelve years
Furniture and fixtures	Three to eight years

Earnings Per Share

Basic earnings per share is computed by dividing net income available to common shareholders by the weighted average number of common shares outstanding during the period. Diluted earnings per share is computed by dividing net income available to common shareholders by the weighted-average number of common shares and dilutive common share equivalents then outstanding. Potential common share equivalents consist of restricted stock awards and the incremental common shares issuable upon the exercise of stock options and warrants. Under the treasury stock method, unexercised "in-the-money" stock options are assumed to be exercised at the beginning of the period or at issuance, if later. The assumed proceeds are then used to purchase common shares at the average market price during the period. Share-based payment awards that entitle their holders to receive non-forfeitable dividends before vesting are considered participating securities and are included in the calculation of basic and diluted earnings per share. There are no such participating securities as of December 31, 2017.

A reconciliation of basic and diluted share amounts is as follows:

	Years ended December 31,		
	2017	2016	2015
Numerator:			
Net income	$28,353,000	$11,681,000	$ 9,345,000
Denominator:			
Basic weighted average common shares outstanding	38,233,527	33,572,883	32,881,940
Effect of dilutive securities:			
Stock options and restricted stock awards	441,924	526,015	695,151
Convertible senior notes	474,923	—	—
Diluted weighted average common shares outstanding	39,150,374	34,098,898	33,577,091
Basic net income per common share	$ 0.74	$ 0.35	$ 0.28
Diluted net income per common share	$ 0.72	$ 0.34	$ 0.28

At December 31, 2017, there were outstanding options to purchase 734,940 shares of the Company's common stock at a weighted average exercise price of $20.80 per share and 505,235 shares of common stock issuable upon the vesting of restricted stock units. For the fiscal year ended December 31, 2017, 317,923 shares of the Company's common stock were excluded from the calculation of diluted earnings per share because the exercise prices of the stock options were greater than or equal to the average price of the common shares, and were therefore anti-dilutive.

As provided by the terms of the indenture underlying the senior convertible notes, the Company has a choice to settle the conversion obligation for the Convertible Notes in cash, shares or any combination of the two. The Company currently intends to settle the par value of the Convertible Notes in cash and any excess conversion premium in shares. The Company applies the provisions of ASC 260, *Earnings Per Share,* Subsection 10-45-44, to determine the diluted weighted average shares outstanding as it relates to the conversion spread on its convertible notes. Accordingly, the par value of the Convertible Notes is not included in the calculation of diluted income per share, but the dilutive effect of the conversion premium is considered in the calculation of diluted net income per share using the treasury stock method. The dilutive impact of the Company's convertible notes is based on the difference between the Company's current period average stock price and the conversion price of the convertible notes, provided there is a premium. Pursuant to this accounting standard, there is no dilution from the accreted principal of the Convertible Notes.

At December 31, 2016, there were outstanding options to purchase 1,236,586 shares of the Company's common stock at a weighted average exercise price of $12.05 per share. For the fiscal year ended December 31, 2016, 381,686 shares of the Company's common stock were excluded from the calculation of diluted earnings per share because the exercise prices of the stock options were greater than or equal to the average price of the common shares, and were therefore anti-dilutive.

At December 31, 2015, there were outstanding options to purchase 1,240,935 shares of the Company's common stock at a weighted average exercise price of $10.44 per share. For the fiscal year ended December 31, 2015, 196,209 shares of the Company's common stock were excluded from the calculation of diluted earnings per share because the exercise prices of the stock options were greater than or equal to the average price of the common shares, and were therefore anti-dilutive.

Segment Reporting

The Company views its operations, makes decisions regarding how to allocate resources and manages its business as one operating segment and two reporting units. As a result, the financial information disclosed herein represents all of the material financial information related to the Company.

The following table represents product revenues by product line (in thousands):

	December 31, 2017	December 31, 2016	December 31, 2015
Protein products	$ 53,969	$ 54,716	$52,938
Filtration products	49,050[3]	19,774[1]	15,676
Chromatography products	36,309[3]	29,520[2]	14,613
Other	1,761[3]	431	310
Total product revenues	$141,089	$104,441	$83,537

(1) 2016 revenue for filtration products includes revenue related to TangenX from December 14, 2016 through December 31, 2016.
(2) 2016 revenue for chromatography products includes revenue related to Atoll from April 1, 2016 through December 31, 2016.
(3) 2017 revenue for filtration, chromatography and other products includes revenue related to Spectrum from August 1, 2017 through December 31, 2017.

Revenue from protein products includes the Company's Protein A ligands and cell culture growth factors. Revenue from filtration products includes the Company's XCell ATF Systems and consumables and Sius filtration products. Revenue from chromatography products includes the Company's OPUS and OPUS PD chromatography columns, chromatography resins and ELISA test kits. Other revenue primarily consists of freight revenues.

The following table represents the Company's total revenue by geographic area (based on the location of the customer):

	Years ended December 31,		
	2017	2016	2015
United States	43%	39%	28%
Sweden	20%	29%	37%
United Kingdom	4%	7%	17%
Other	33%	25%	18%
Total	100%	100%	100%

The following table represents the Company's total assets by geographic area (in thousands):

	December 31, 2017	December 31, 2016
United States	$654,673	$209,728
Europe	85,169	79,145
Asia	3,677	40
Total	$743,519	$288,913

The following table represents the Company's long-lived assets by geographic area (in thousands):

	December 31, 2017	December 31, 2016
United States	$465,453	$ 77,039
Europe	34,430	27,721
Asia	854	—
Total	$500,737	$104,760

Concentrations of Credit Risk and Significant Customers

Financial instruments that subject the Company to significant concentrations of credit risk primarily consist of cash and cash equivalents, marketable securities and accounts receivable. Per the Company's investment policy, cash equivalents and marketable securities are invested in financial instruments with high credit ratings and credit exposure to any one issue, issuer (with the exception of U.S. treasury obligations) and type of instrument is limited. At December 31, 2017 and 2016, the Company had no investments associated with foreign exchange contracts, options contracts or other foreign hedging arrangements.

Concentration of credit risk with respect to accounts receivable is limited to customers to whom the Company makes significant sales. While a reserve for the potential write-off of accounts receivable is maintained, the Company has not written off any significant accounts to date. To control credit risk, the Company performs regular credit evaluations of its customers' financial condition.

Revenue from significant customers as a percentage of the Company's total revenue is as follows:

	Years ended December 31,		
	2017	2016	2015
GE Healthcare	21%	29%	37%
MilliporeSigma	18%	28%	29%

Significant accounts receivable balances as a percentage of the Company's total trade accounts receivable and royalties and other receivable balances are as follows:

	December 31, 2017	December 31, 2016
GE Healthcare	11%	26%
MilliporeSigma	19%	8%

Goodwill, Other Intangible Assets and Acquisitions

Acquisitions

Total consideration transferred for acquisitions is allocated to the assets acquired and liabilities assumed, if any, based on their fair values at the dates of acquisition. The fair value of identifiable intangible assets is based on detailed valuations that use information and assumptions determined by management. Any excess of purchase price over the fair value of the net tangible and intangible assets acquired is allocated to goodwill. Any excess of the fair value of the net tangible and intangible assets acquired over the purchase price is recognized in the statement of operations. The fair value of contingent consideration includes estimates and judgments made by management regarding the probability that future contingent payments will be made and the extent of royalties to be earned in excess of the defined minimum royalties. Management updates these estimates and the related fair value of contingent consideration at each reporting period. Changes in the fair value of contingent consideration are recorded in the consolidated statements of operations.

The Company uses the income approach to determine the fair value of certain identifiable intangible assets including customer relationships and developed technology. This approach determines fair value by estimating after-tax cash flows attributable to these assets over their respective useful lives and then discounting these after-tax cash flows back to a present value. The Company bases its assumptions on estimates of future cash flows, expected growth rates, expected trends in technology, etc. Discount rates used to arrive at a present value as of the date of acquisition are based on the time value of money and certain industry-specific risk factors.

Goodwill

Goodwill is not amortized and is reviewed for impairment at least annually. There was no evidence of impairment to goodwill at December 31, 2017 and 2016. There were no goodwill impairment charges during the fiscal years ended December 31, 2017, 2016 and 2015.

Intangible Assets

Intangible assets are amortized over their useful lives using the estimated economic benefit method, as applicable, and the amortization expense is recorded within cost of product revenue and selling, general and administrative expense in the statements of operations. Intangible assets and their related useful lives are reviewed at least annually to determine if any adverse conditions exist that would indicate the carrying value of these assets may not be recoverable. More frequent impairment assessments are conducted if certain conditions exist, including a change in the competitive landscape, any internal decisions to pursue new or different technology strategies, a loss of a significant customer, or a significant change in the marketplace, including changes in the prices paid for our products or changes in the size of the market for our products. If impairment indicators are present, the Company determines whether the underlying intangible asset is recoverable through estimated future undiscounted cash flows. If the asset is not found to be recoverable, it is written down to the estimated fair value of the asset based on the sum of the future discounted cash flows expected to result from the use and disposition of the asset. If the estimate of an intangible asset's remaining useful life is changed, the remaining carrying amount of the intangible asset is amortized prospectively over the revised remaining useful life. The Company continues to believe that its intangible assets are recoverable at December 31, 2017.

Intangible assets consisted of the following at December 31, 2017 (in thousands):

	Gross Carrying Amount	Accumulated Amortization	Weighted Average Useful Life (in years)
Technology – developed	$ 51,801	$ (3,201)	19
Patents	240	(238)	8
Customer relationships	102,120	(9,636)	14
Trademarks – definite lived	2,160	(47)	20
Trademarks – indefinite lived	700	—	—
Other intangibles	1,063	(209)	3
Total intangible assets	$158,084	$(13,331)	16

Intangible assets consisted of the following at December 31, 2016 (in thousands):

	Gross Carrying Amount	Accumulated Amortization	Weighted Average Useful Life (in years)
Technology – developed	$12,911	$(1,468)	17
Patents	240	(208)	8
Customer relationships	22,555	(4,995)	11
Trademark/ tradename	711	—	—
Other intangibles	84	(24)	2
Total intangible assets	$36,501	$(6,695)	13

Amortization expense for amortized intangible assets was approximately $6,215,000, $2,052,000 and $1,600,000 for the years ended December 31, 2017, 2016 and 2015, respectively. As of December 31, 2017, the Company expects to record the following amortization expense (in thousands):

Year Ending	Amortization Expense
December 31, 2018	$10,633
December 31, 2019	10,578
December 31, 2020	9,894
December 31, 2021	9,376
December 31, 2022	9,374

Stock Based Compensation

The Company measures stock-based compensation cost at the grant date based on the estimated fair value of the award, and recognizes it as expense over the employee's requisite service period on a straight-line basis. The Company records the expense for share-based awards subject to performance-based milestone vesting over the remaining service period when management determines that achievement of the milestone is probable. Management evaluates whether the achievement of a performance-based milestone is probable as of the reporting date. The Company has no awards that are subject to market conditions. The Company recognizes stock-based compensation expense based upon options that are ultimately expected to vest, and accordingly, such compensation expense has been adjusted by an amount of estimated forfeitures.

The Company uses the Black-Scholes option pricing model to calculate the fair value of share-based awards on the grant date. The following assumptions are used in calculating the fair value of share-based awards:

Expected term – The expected term of options granted represents the period of time for which the options are expected to be outstanding. For purposes of estimating the expected term, the Company has aggregated all individual option awards into one group as the Company does not expect substantial differences in exercise behavior among its employees.

Expected volatility – The expected volatility is a measure of the amount by which the Company's stock price is expected to fluctuate during the expected term of options granted. The Company determines the expected volatility based primarily upon the historical volatility of the Company's common stock over a period commensurate with the option's expected term.

Risk-free interest rate – The risk-free interest rate is the implied yield available on U.S. Treasury zero-coupon issues with a remaining term equal to the option's expected term on the grant date.

Expected dividend yield – The Company has never declared or paid any cash dividends on any of its capital stock and does not expect to do so in the foreseeable future. Accordingly, the Company uses an expected dividend yield of zero to calculate the grant-date fair value of a stock option.

Estimated forfeiture rates – The Company has applied, based on an analysis of its historical forfeitures, annual forfeiture rates of 8% for awards granted to non-executive level employees, 3% for awards granted to executive level employees and 0% for awards granted to non-employee members of the Board of Directors to all unvested stock options as of December 31, 2017. The Company reevaluates this analysis periodically and adjusts these estimated forfeiture rates as necessary. Ultimately, the Company will only recognize expense for those shares that vest.

Recently Issued Accounting Pronouncements

In May 2014, the FASB issued ASU No. 2014-09, "Revenue from Contracts with Customers (Topic 606)," which supersedes the revenue recognition requirements in Accounting Standards Codification Topic 605, *Revenue Recognition*, and creates a new Topic 606, *Revenue from Contracts with Customers*. Two adoption methods are permitted: retrospectively to all prior reporting periods presented, with certain practical expedients permitted; or retrospectively with the cumulative effect of initially adopting the ASU recognized at the date of initial application. The adoption of this ASU will include updates as provided under ASU 2015-14, "Revenue from Contracts with Customers (Topic 606): Deferral of the Effective Date"; ASU 2016-08, "Revenue from Contracts with Customers (Topic 606): Principal versus Agent Considerations (Reporting Revenue Gross versus Net)"; ASU 2016-10, "Revenue from Contracts with Customers (Topic 606): Identifying Performance Obligations and Licensing"; and ASU 2016-12, "Revenue from Contracts with Customers (Topic 606): Narrow-Scope Improvements and Practical Expedients." The Company intends to adopt the provisions of Topic 606 using the modified retrospective method effective January 1, 2018. The Company has completed its assessment of the impact of the new revenue standard on its current contracts of all principal revenue streams and has determined that the new standard will not have a material impact on its consolidated financial statements. The Company will modify its accounting policies and procedures beginning in the first quarter of 2018 related to variable pricing and material rights in certain of its contracts. The Company will not require significant changes to its business processes, systems and controls to comply with this new standard.

In July 2015, the FASB issued ASU No. 2015-11, "Inventory (Topic 330): Simplifying the Measurement of Inventory" ("ASU 2015-11"). ASU 2015-11 requires inventory be measured at the lower of cost and net realizable value, and options that currently exist for market value be eliminated. ASU 2015-11 defines net realizable value as estimated selling prices in the ordinary course of business, less reasonably predictable costs of completion, disposal, and transportation. The guidance is effective prospectively for reporting periods beginning after December 15, 2016 and interim periods within those fiscal years with early adoption permitted. The adoption of ASU 2015-11 did not have a material impact on its consolidated financial statements, as it does not measure any inventory at market value.

In February 2016, the FASB issued ASU No. 2016-02, "Leases (Topic 842)" ("ASU 2016-02"). ASU 2016-02 requires lessees to recognize a right-of-use asset and a lease liability for most leases. Extensive quantitative and qualitative disclosures, including significant judgments made by management, will be required to provide greater insight into the extent of revenue and expense recognized and expected to be recognized from existing contracts. The accounting applied by a lessor is largely unchanged from that applied under the current standard. The standard must be adopted using a modified retrospective transition approach and provides for certain practical expedients. The ASU is effective for public entities for fiscal years beginning after December 15, 2018, with early adoption permitted. The Company has not yet completed its assessment of the impact of the new standard on its consolidated financial statements; however, the Company anticipates that it will recognize right-of-use assets and lease liabilities for leases on its current facilities.

In March 2016, the FASB issued ASU No. 2016-09, "Compensation—Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting", which aims to simplify several aspects of the accounting for share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, classification of certain items on the statement of cash flows and accounting for forfeitures. The ASU is effective for public entities for fiscal years beginning after December 15, 2016, with early adoption permitted. The Company adopted the provisions of this ASU as of January 1, 2017. As a result of this standard, the Company increased its U.S. federal and state net operating loss carryovers by approximately $5.1 million for previously unrecognized excess tax benefits outstanding as of January 1, 2017. Since the Company maintained a full valuation allowance on its net U.S. deferred tax assets as of the adoption date, the Company recorded a corresponding increase to the valuation allowance and the impact of adopting ASU 2016-09 on retained earnings is zero.

In August 2016, the FASB issued ASU No. 2016-15, "Statement of Cash Flows (Topic 203): Classification of Certain Cash Receipts and Cash Payments". ASU No. 2016-15 addresses eight specific cash flow issues and clarifies their presentation and classification in the Statement of Cash Flows. ASU No. 2016-15 is effective for fiscal years beginning after December 15, 2017 and is to be applied retrospectively with early adoption permitted. The Company does not expect the adoption of ASU 2016-15 to have a material impact on its consolidated financial statements.

In November 2016, the FASB issued ASU No. 2016-18, "Statement of Cash Flows (Topic 230): Restricted Cash," which requires that the statement of cash flows explain the change during the period in the total cash, which is inclusive of cash and cash equivalents and amounts generally described as restricted cash or restricted cash equivalents. Restricted cash and restricted cash equivalents will be included with cash and cash equivalents when reconciling the beginning of period and end of period balances on the statement of cash flows upon adoption of this standard. The ASU is effective for the Company on January 1, 2018 with early adoption permitted. The Company intends to adopt the ASU on January 1, 2018. Upon adoption, the ASU requires retrospective application. Beginning in 2018, the Company will include $450,000 of restricted cash with total cash and cash equivalents in its 2016 and 2017 cash flow statements.

3. Acquisitions, Goodwill and Other Intangible Assets

Acquisitions

Spectrum LifeSciences, LLC

On August 1, 2017, the Company completed the acquisition of Spectrum pursuant to the terms of the Agreement and Plan of Merger and Reorganization, dated as of June 22, 2017 (such acquisition, the "Spectrum Acquisition").

Spectrum is a diversified filtration company with a differentiated portfolio of hollow fiber cartridges, bench-top to commercial scale filtration and perfusion systems and a broad portfolio of disposable and single-use solutions. Spectrum's products are primarily used for the filtration, isolation, purification and concentration of monoclonal antibodies, vaccines, recombinant proteins, diagnostic products and cell therapies where the company offers both standard and customized solutions to its bioprocessing customers.

Spectrum's filtration products include its KrosFlo® line of hollow-fiber cartridges, tangential flow filtration (TFF) systems and single-use flow path consumables, as well as its Spectra/Por® portfolio of laboratory dialysis products and its Pro-Connex® single-use hollow fiber Module-Bag-Tubing (MBT) sets. Outside of filtration, the company sells its Spectra/Chrom® liquid chromatography products for research applications. These bioprocessing products account for the majority of Spectrum revenues. Spectrum also offers a line of operating room products.

The Spectrum Acquisition was accounted for as a purchase of a business under ASC 805, Business Combinations. The Spectrum Acquisition was funded through payment of approximately $122.9 million in cash, 6,153,995 unregistered shares of the Company's common stock totaling $247.6 million and a working capital adjustment of $425,000 for a total purchase price of $370.9 million.

Consideration Transferred

The Company accounted for the Spectrum Acquisition as a purchase of a business under U.S. GAAP. Under the acquisition method of accounting, the assets of Spectrum were recorded as of the acquisition date, at their respective fair values, and consolidated with those of the Company. The fair value of the net assets acquired was approximately $370.9 million.

The preparation of the valuation required the use of significant assumptions and estimates. Critical estimates included, but were not limited to, future expected cash flows, including projected revenues and expenses, and the applicable discount rates. These estimates were based on assumptions that the Company believes to be reasonable; however, actual results may differ from these estimates.

The total consideration transferred follows (in thousands):

Cash consideration	$122,932
Equity consideration	247,575
Working capital adjustment	425
Net assets acquired	$370,932

Acquisition-related costs are not included as a component of consideration transferred, but are expensed in the periods in which the costs are incurred. The Company has incurred $7,060,000 in costs related to the Spectrum Acquisition for the year ended December 31, 2017. These costs are primarily included in selling, general and administrative expenses in the consolidated statements of operations.

Fair Value of Net Assets Acquired

The allocation of purchase price was based on the fair value of assets acquired and liabilities assumed as of August 1, 2017, based on the preliminary valuation. The components and allocation of the purchase price consists of the following amounts (in thousands):

Cash and cash equivalents	$ 10,137
Accounts receivable	5,075
Inventory	13,705
Prepaid expenses and other assets	616
Fixed assets	6,004
Deferred tax assets	1,102
Customer relationships	78,400
Developed technology	38,560
Trademark and tradename	2,160
Non-competition agreements	960
Goodwill	265,519
Accounts payable	(1,335)
Unrecognized tax benefit	(576)
Accrued liabilities	(5,787)
Deferred tax liabilities	(43,608)
Fair value of net assets acquired	$370,932

Of the consideration paid, $78.4 million represents the fair value of customer relationships that will be amortized over the weighted average determined useful life of 15 years, and $38.6 million represents the fair value of developed technology that will be amortized over a determined useful life of 20 years. $960,000 represents the fair value of non-competition agreements that will be amortized over a determined life of 3 years. $2.2 million represents the fair value of trademarks that will be amortized over a determined life of 2 to 20 years. The aforementioned intangible assets will be amortized on a straight-line basis.

The goodwill of $265.5 million represents future economic benefits expected to arise from synergies from combining operations and commercial organizations to increase market presence and the extension of existing customer relationships. None of the goodwill recorded is expected to be deductible for income tax purposes.

The purchase price allocation may be subject to adjustment as purchase accounting is preliminary as of December 31, 2017 related to inventory valuation, and accordingly, the fair value of inventory acquired may be subject to change.

Revenue, Net Income and Pro Forma Presentation

The Company recorded revenue from Spectrum of $19,394,000 from August 1, 2017 through December 31, 2017. The Company has included the operating results of Spectrum in its consolidated statements of operations since the August 1, 2017 acquisition date. The following table presents unaudited supplemental pro forma information as if both the Spectrum Acquisition had occurred as of January 1, 2016 and the TangenX Acquisition had occurred as of January 1, 2015 (in thousands, except per share data):

	December 31, 2017	December 31, 2016
Total revenue	162,913	145,994
Net income (loss)	17,220	(12,656)
Earnings (loss) per share:		
Basic	$ 0.41	$ (0.32)
Diluted	$ 0.40	$ (0.32)

The unaudited pro forma information for the years ended December 31, 2017 and 2016 was calculated after applying the Company's accounting policies and the impact of acquisition date fair value adjustments. Unaudited pro forma net income for year ended December 31, 2017 was adjusted to exclude acquisition-related transaction costs, nonrecurring expenses related to the fair value adjustments associated with the acquisition and income tax benefits resulting from the acquisition. In addition, the unaudited pro forma net income for the year ended December 31, 2017 was adjusted to include incremental amortization of intangible assets. These items have been factored to the unaudited pro forma net income for the year ended December 31, 2017. The unaudited pro forma net loss for the year ended December 31, 2016 was adjusted to include acquisition-related transaction costs, expenses related to the fair value adjustments, amortization of intangible assets, and income tax benefits resulting from the acquisition.

These pro forma condensed consolidated financial results have been prepared for comparative purposes only and include certain adjustments to reflect the pro forma results of operations as if the acquisition had occurred as of the beginning of the periods presented, such as fair value adjustments to inventory and increased amortization for the fair value of acquired intangible assets. The pro forma information does not reflect the effect of costs or synergies that would have been expected to result from the integration of the acquisition. The pro forma information does not purport to be indicative of the results of operations that actually would have resulted had the combination occurred at the beginning of each period presented, or of future results of the consolidated entities.

TangenX Technology Corporation

On December 14, 2016, the Company acquired TangenX Technology Corporation ("TangenX"), pursuant to the terms of the Share Purchase Agreement, dated as of December 14, 2016 (the "Share Purchase Agreement"), by and among the Company and TangenX (such acquisition, the "TangenX Acquisition"). The Company acquired all outstanding shares and the business of TangenX, including TangenX's innovative single-use Sius line of tangential flow filtration ("TFF") cassettes and hardware used in downstream biopharmaceutical manufacturing processes.

Sius TFF is used in the filtration of biological drugs, complimenting Repligen's OPUS line of pre-packed chromatography columns used in downstream purification. Pursuant to the Share Purchase Agreement, Repligen acquired all of the outstanding shares of TangenX, as well as certain assets and liabilities. Effective June 30, 2017, TangenX was legally merged with and into the Company.

The TangenX Acquisition was accounted for as a purchase of a business under ASC 805, "Business Combinations." The total purchase price of the TangenX Acquisition was $37.1 million in cash.

Consideration Transferred

The Company accounted for the TangenX Acquisition as the purchase of a business under U.S. GAAP. Under the acquisition method of accounting, the assets of TangenX were recorded as of the acquisition date, at their respective fair values, and consolidated with those of Repligen. The fair value of the net assets acquired was approximately $37.1 million.

The preparation of the valuation required the use of significant assumptions and estimates. Critical estimates included, but were not limited to, future expected cash flows, including projected revenues and expenses, and the applicable discount rates. These estimates were based on assumptions that the Company believes to be reasonable. However, actual results may differ from these estimates.

The total consideration transferred follows (in thousands):

Cash consideration	$37,532
Less: working capital adjustment	(382)
Net assets acquired	$37,150

Acquisition related costs are not included as a component of consideration transferred, but are expensed in the periods in which the costs are incurred. The Company incurred transaction costs of $431,000 in the year ended December 31, 2017 and $935,000 in the year ended December 31, 2016 related to the TangenX Acquisition. The transaction costs are included in selling, general and administrative expenses in the consolidated statements of operations.

Fair Value of Net Assets Acquired

The allocation of purchase price was based on the fair value of assets acquired and liabilities assumed as of December 14, 2016. The components and allocation of the purchase price consists of the following amounts (in thousands):

Cash and cash equivalents	$ 1,218
Accounts receivable	459
Other receivables	111
Inventory	936
Other current assets	50
Fixed assets, net	215
Customer relationships	6,192
Developed technology	6,044
Non-competition agreements	21
Trademark and trade name	11
Accounts payable and other liabilities assumed	(3,083)
Deferred tax liabilities	(4,525)
Goodwill	29,501
Net assets acquired	$37,150

Of the consideration paid, $6.2 million represents the fair value of customer relationships that will be amortized over the determined useful life of 13 years and $6.0 million represents the fair value of developed technology that will be amortized over a determined useful life of 20 years. $21,000 represents the fair value of non-competition agreements that will be amortized over a determined life of 5 years. $11,000 represents the fair

value of trademarks and trade names that will be amortized over a determined useful life of 2 years. The aforementioned intangible assets will be amortized on a straight-line basis.

The goodwill of $29.5 million represents future economic benefits expected to arise from synergies from combining operations and the extension of existing customer relationships.

Revenue, Net Income and Pro Forma Presentation

The Company recorded revenue from TangenX of approximately $119,000 from December 15, 2016 through December 31, 2016. The Company has included the operating results of TangenX in its consolidated statements of operations since the December 15, 2016 acquisition date. The following table presents unaudited supplemental pro forma information as if the TangenX Acquisition had occurred as of January 1, 2015 (in thousands, except per share data):

	December 31, 2016	December 31, 2015
Total revenue	110,228	88,437
Net income	5,744	13,208
Earnings per share:		
Basic	$ 0.17	$ 0.40
Diluted	$ 0.17	$ 0.39

The unaudited pro forma information for the year ended December 31, 2016 and 2015 was calculated after applying the Company's accounting policies and the impact of acquisition date fair value adjustments. Unaudited pro forma net income for year ended December 31, 2016 was adjusted to exclude acquisition-related transaction costs, nonrecurring expenses related to the fair value adjustments associated with the acquisition, and income tax benefits resulting from the acquisition. In addition, the unaudited pro forma net income for the year ended December 31, 2016 was adjusted to include incremental amortization of intangible assets. These items have been factored to the unaudited pro forma net income for the year ended December 31, 2016. The unaudited pro forma net income for the year ended December 31, 2015 was adjusted to include these acquisition-related transaction costs, expenses related to the fair value adjustments, amortization of intangible assets, and income tax benefits resulting from the acquisition.

These pro forma condensed consolidated financial results have been prepared for comparative purposes only and include certain adjustments to reflect the pro forma results of operations as if the acquisition had occurred as of the beginning of the periods presented, such as fair value adjustments to inventory and increased amortization for the fair value of acquired intangible assets. The pro forma information does not reflect the effect of costs or synergies that would have been expected to result from the integration of the acquisition. The pro forma information does not purport to be indicative of the results of operations that actually would have resulted had the combination occurred at the beginning of each period presented, or of future results of the consolidated entities.

Atoll GmbH

On April 1, 2016, the Company's subsidiary Repligen Sweden acquired Atoll GmbH ("Atoll") from UV-Cap GmbH & Co. KG (the "Seller") pursuant to a Share Purchase Agreement (the "Share Purchase Agreement"), dated as of March 31, 2016 (such acquisition, the "Atoll Acquisition"), by and among Repligen Sweden, the Seller, and the Company, in its capacity as guarantor of the obligations of Repligen Sweden under the Share Purchase Agreement. The Atoll Acquisition was subject to certain closing conditions that did not occur until April 1, 2016. Payment for the Atoll Acquisition was denominated in Euros but is reflected here in U.S. dollars for presentation purposes.

In connection with the Atoll Acquisition, the Company issued and contributed 538,700 shares of the Company's common stock, par value of $0.01 per share valued at $14.1 million (the "Stock Consideration") to Repligen

Sweden through a transfer by the Company on behalf of Repligen Sweden to fulfill Repligen Sweden's obligation to deliver the Stock Consideration under the Share Purchase Agreement. The issuance of the Stock Consideration was not registered under the Securities Act of 1933, as amended (the "Securities Act"), in reliance upon the exemption from registration provided by Section 4(2) of the Securities Act. The Stock Consideration was based on the fair value of the Company's common stock on April 1, 2016.

This acquisition strengthened Repligen's bioprocessing business by adding a complementary extension to an existing product line while expanding its direct sales presence worldwide. On September 20, 2016, Atoll changed its name to Repligen GmbH.

The Atoll Acquisition was accounted for as a purchase of a business under ASC 805, "Business Combinations." The total purchase price of the Atoll Acquisition was $25.3 million, consisting of an upfront cash payment of $10.2 million, less $74,000 as a result of the final determination of working capital, issuance of the Stock Consideration, and a future potential milestone payment of $1.1 million if specific revenue growth targets are met for 2016. The $1.1 million potential contingent consideration had an initial probability weighted fair value at the time of the closing of the Atoll Acquisition of approximately $952,000.

Consideration Transferred

The Company accounted for the Atoll Acquisition as the purchase of a business under U.S. GAAP. Under the acquisition method of accounting, the assets of Atoll were recorded as of the acquisition date, at their respective fair values, and consolidated with those of Repligen. The fair value of the net assets acquired was approximately $25.3 million.

The preparation of the valuation required the use of significant assumptions and estimates. Critical estimates included, but were not limited to, future expected cash flows, including projected revenues and expenses, and the applicable discount rates. These estimates were based on assumptions that the Company believes to be reasonable. However, actual results may differ from these estimates.

The total consideration transferred follows (in thousands):

Cash consideration, less $74 of working capital adjustments	$10,176
Value of common stock issued	14,138
Estimated fair value of contingent consideration	952
Total consideration transferred	$25,266

The fair value of contingent consideration was determined based upon a probability weighted analysis of expected future milestone and settlement payments to be made to the Seller. The Company could make a contingent consideration payment of $1.1 million if specific revenue growth targets are met for 2016. The liability for contingent consideration was included in current liabilities on the consolidated balance sheets. Because the contingent consideration related only to 2016 sales growth, no further remeasurement of this liability was required as of December 31, 2016. See Note 9 – Accrued Liabilities for further details.

Acquisition related costs are not included as a component of consideration transferred, but are expensed in the periods in which the costs are incurred. The Company incurred $1,307,000 in transaction costs related to the Atoll Acquisition. The transaction costs are included in selling, general and administrative expenses in the consolidated statements of operations.

Fair Value of Net Assets Acquired

The allocation of purchase price was based on the fair value of assets acquired and liabilities assumed as of April 1, 2016. The components and allocation of the purchase price consists of the following amounts (in thousands):

Cash and cash equivalents	$ 1,409
Accounts receivable	697
Inventory	155
Other current assets	169
Fixed assets	114
Customer relationships	5,318
Developed technology	2,175
Non-competition agreements	57
Trademark and trade name	11
Deferred tax assets	885
Accounts payable and other liabilities assumed	(599)
Deferred tax liabilities	(2,202)
Goodwill	17,077
Net assets acquired	$25,266

Of the consideration paid, $5.3 million represents the fair value of customer relationships that will be amortized over the determined useful life of 13 years and $2.2 million represents the fair value of developed technology that will be amortized over a determined useful life of 14 years. $57,000 represents the fair value of non-competition agreements and $11,000 represents the fair value of trademarks and trade names that will be amortized over a determined useful life of 2 years. The aforementioned intangible assets will be amortized on a straight-line basis.

The goodwill of $17.1 million represents future economic benefits expected to arise from synergies from combining operations, utilizing the Company's existing sales infrastructure to increase market presence and the extension of existing customer relationships.

Goodwill

The changes in the carrying value of goodwill for the year ended December 31, 2017 is as follows (in thousands):

Balance at December 31, 2016	$ 59,548
Goodwill adjustments arising from the TangenX Acquisition	85
Goodwill arising from the Spectrum Acquisition	265,519
Foreign currency adjustments on goodwill from the Atoll Acquisition	2,181
Balance at December 31, 2017	$327,333

Other Intangible Assets

Intangible assets, except for the ATF tradename, are amortized over their useful lives using the estimated economic benefit method, as applicable, and the amortization expense is recorded within selling, general and administrative expense in the Company's statements of comprehensive income. The ATF tradename are not amortized. The Company reviews its indefinite-lived intangible assets not subject to amortization to determine if adverse conditions exist or a change in circumstances exists that would indicate an impairment. Intangible assets and their related useful lives are reviewed at least annually to determine if any adverse conditions exist that

would indicate the carrying value of these assets may not be recoverable. More frequent impairment assessments are conducted if certain conditions exist, including a change in the competitive landscape, any internal decisions to pursue new or different technology strategies, a loss of a significant customer, or a significant change in the marketplace, including changes in the prices paid for our products or changes in the size of the market for our products. An impairment results if the carrying value of the asset exceeds the estimated fair value of the asset. If the estimate of an intangible asset's remaining useful life is changed, the remaining carrying amount of the intangible asset is amortized prospectively over the revised remaining useful life. The Company continues to believe that its intangible assets are recoverable at December 31, 2017.

4. Income Taxes

Income tax data for the years ended December 31, 2017, 2016 and 2015 (in thousands):

	December 31, 2017	December 31, 2016	December 31, 2015
The components of income from operations before income taxes are as follows:			
Domestic	$ (6,709)	$ (4,882)	$ (2,490)
Foreign	13,957	16,574	15,913
Total	$ 7,248	$11,692	$13,423
The current and deferred components of the provision for income taxes on operations are as follows:			
Current	$ 3,624	$ 4,077	$ 3,745
Deferred	(24,729)	(4,066)	333
Total	$(21,105)	$ 11	$ 4,078
The jurisdictional components of the provision for income taxes on operations are as follows:			
Federal	$(24,012)	$ (3,809)	$ 295
State	(438)	(207)	276
Foreign	3,345	4,027	3,507
Total	$(21,105)	$ 11	$ 4,078

At December 31, 2017, the Company had net operating loss carryforwards of approximately $19,652,000 in the U.S., net operating loss carryforwards of approximately €603,000 (approximately $722,000) in Germany, federal business tax credit carryforwards of $297,000 and state business tax credit carryforwards of approximately $99,000 available to reduce future domestic income taxes, if any. The net operating loss and business tax credits carryforwards will continue to expire at various dates through December 2037. The net operating loss and business tax credit carryforwards are subject to review and possible adjustment by the Internal Revenue Service and may be limited in the event of certain changes in the ownership interest of significant stockholders.

	December 31, 2017	December 31, 2016
Deferred tax assets:		
Temporary timing differences:		
Stock compensation	$ 1,662	$ 1,722
Contingent consideration	2,196	3,333
Other	1,704	1,895
Total temporary timing differences	5,562	6,950
Net operating loss carryforwards	4,361	12,284
Tax business credits carryforwards	1,265	2,036
Total deferred tax assets	11,188	21,270
Valuation allowance	(6)	(9,979)
Net deferred tax assets	$ 11,182	$ 11,291
Deferred tax liabilities:		
Goodwill and intangible assets	$(33,166)	$ (7,346)
Conversion option on convertible notes	(3,183)	(6,048)
Total deferred tax liabilities	$(36,349)	$(13,394)
Net deferred tax liabilities	$(25,167)	$ (2,103)

The net change in the total valuation allowance was a decrease of $9,973,000 in the year ended December 31, 2017 and consisted of the following changes. During the first quarter of 2017 the Company adopted ASU 2016-09. ASU 2016-09 states that previously unrecognized excess tax benefits related to stock based compensation should be recognized on a modified retrospective basis. As such, the Company increased its U.S. federal and state net operating loss carryovers by approximately $5,100,000 as of January 1, 2017 for previously unrecognized stock based compensation excess tax benefits outstanding as of the beginning of the period. Because the Company maintained a full valuation allowance on its U.S. deferred tax assets at that date, the Company recorded a corresponding increase to the valuation allowance as of January 1, 2017. During the second quarter of 2017, the Company agreed to sell certain intellectual property to Repligen Sweden AB that allowed for the Company to utilize certain of its U.S. deferred tax assets. Accordingly, the Company reduced its valuation allowance on its U.S. deferred tax assets by approximately $9,200,000. Additionally, in conjunction with the Spectrum Acquisition, the Company determined that its U.S. deferred tax assets were more likely than not to be realized after considering deferred tax liabilities related to the acquired intangible assets. Accordingly, the Company reduced its valuation allowance on its U.S. deferred tax assets by $5,872,000. The valuation allowance decreased by $8,535,000 for the year ended December 31, 2016 and increased by $1,216,000 for the year ended December 31, 2015. As of December 31, 2017, the Company believes that realization of its deferred tax assets related to capital loss carryovers is not more likely than not, and the Company continues to maintain its valuation allowance against those U.S. deferred tax assets.

The reconciliation of the federal statutory rate to the effective income tax rate for the fiscal years ended December 31, 2017, 2016 and 2015 is as follows (amounts in thousands):

	Year Ended					
	December 31, 2017		December 31, 2016		December 31, 2015	
Income before income taxes	$ 7,248		$11,692		$13,423	
Expected tax at statutory rate	2,537	35.0%	3,975	34.0%	4,564	34.0%
Adjustments due to:						
Difference between U.S. and foreign tax	(1,797)	(24.8%)	(2,031)	(17.4%)	(1,910)	(14.2%)
State income and franchise taxes	(307)	(4.2%)	(326)	(2.8%)	563	4.2%
Business tax credits	(7,708)	(9.8%)	(236)	(2.0%)	(115)	(0.9%)
Permanent differences:						
Stock compensation	(946)	(13.1%)	31	0.3%	348	2.6%
Transaction costs	1,232	17.0%	156	1.3%	—	—
Other	470	6.4%	380	3.2%	(230)	(1.7%)
Change in U.S. federal tax rates	(12,839)	(177.2%)	—	—	—	—
Transition tax	3,266	45.1%	—	—	—	—
Change in valuation allowance	(12,164)	(167.8%)	(1,981)	(16.9%)	1,216	9.1%
Other	(151)	(2.1%)	43	0.4%	(358)	(2.7%)
Provision for income taxes	$(21,105)	(291.2%)	$ 11	0.1%	$ 4,078	30.4%

The Company's tax returns are subject to examination by federal, state and international taxing authorities for the following periods:

Jurisdiction	Fiscal years subject to examination
United States – federal and state	2014-2017
Sweden	2011-2017
Germany	2016-2017
Netherlands	2012-2017

The following is a tabular reconciliation of the total amounts of unrecognized tax benefits (in thousands):

Unrecognized tax benefits at January 1, 2017	1,407
Gross increases – tax positions in prior period	679
Gross increases – tax positions in current period	199
Gross decreases – release	(479)
Unrecognized tax benefits at December 31, 2017	$1,806

Included in the balance of unrecognized tax benefits as of December 31, 2017 are $1,806,000, of tax benefits that, if recognized, would affect the effective tax rate.

At December 31, 2017, the Company has not provided for U.S. income taxes or foreign withholding taxes on outside basis differences of foreign subsidiaries of approximately $53,747,000 as it is the Company's current intention to permanently reinvest these earnings outside the U.S.

On December 22, 2017, President Trump signed into law H.R. 1/Public Law No. 115-97, the tax legislation commonly known as the Tax Cuts and Jobs Act (the "Act"). The Act made significant changes to federal tax law, including, but not limited to, a reduction in the federal income tax rate from 35% to 21%, taxation of certain global intangible low-taxed income, allowing for immediate expensing of qualified assets, stricter limits on deductions for interest and certain executive compensation, and a one-time transition tax on previously deferred

earnings of certain foreign subsidiaries. Due to the complexities involved in accounting for the enactment of the Act, the SEC staff issued Staff Accounting Bulletin No. 118 ("SAB 118"), which allows a registrant to record provisional amounts during a measurement period not to extend beyond one year of the enactment date. Under the SAB 118 guidance, we have determined that our accounting for the following items is incomplete where noted, we are able to make reasonable estimates for certain effects of tax reform and therefore have recorded provisional amounts.

The Act lowered the Company's U.S. statutory federal tax rate from 35% to 21% effective January 1, 2018. The Company recorded a tax benefit of $12,812,000 in the year ended December 31, 2017 for the reduction in its US deferred tax assets and liabilities resulting from the rate change.

The Act also includes a one-time deemed repatriation transition tax whereby entities that are shareholders of a specified foreign corporation must include in gross income the undistributed and previously untaxed post-1986 earnings and profits of the specified foreign corporation. Our provisional amount recorded at December 31, 2017 increased our tax provision by $3,266,000. This amount may change as we refine our calculations of post-1986 earnings and profits for our foreign subsidiaries, as well as the amounts held in cash.

We anticipate that future guidance and interpretations with the respect to the Act will cause us to further adjust the provisional amounts recorded as of December 31, 2017. Any measurement period adjustments will be reported as a component of provision for income taxes in the reporting period the amounts are determined. The final accounting will be completed no later than one year from the enactment of the Act.

5. Stockholders' Equity

Public Offering of Common Stock

On July 3, 2017, the Company completed a public offering in which 2,807,017 shares of its common stock were sold to the public at a price of $42.75 per share. The underwriters were granted an option, which they exercised in full, to purchase an additional 421,052 shares of the Company's common stock. The total proceeds from this offering, net of underwriting discounts, commissions and other offering expenses, totaled approximately $129.3 million.

Stock-Based Compensation

The Company recorded stock-based compensation expense of approximately $6,747,000, $4,595,000 and $3,598,000 for the years ended December 31, 2017, 2016 and 2015, respectively, for share-based awards granted under the Second Amended and Restated 2001 Repligen Corporation Stock Plan (the "2001 Plan") and the Repligen Corporation 2012 Stock Option and Incentive Plan (the "2012 Plan," and collectively with the 2001 Plan and the 1992 Repligen Corporation Stock Option Plan, the "Plans").

The following table presents stock-based compensation expense in the Company's consolidated statements of operations (in thousands):

	Years ended December 31,		
	2017	2016	2015
Cost of product revenue	$ 704	$ 341	$ 213
Research and development	481	537	336
Selling, general and administrative	5,562	3,717	3,049
Total	$6,747	$4,595	$3,598

During 2016, the Company modified certain stock option grants for its former senior vice president of research and development in conjunction with his retirement. As part of the April 2016 transition agreement, all outstanding equity awards continued to vest through December 31, 2016, and fifty percent (50%) of the option awards that are unvested on February 28, 2017 immediately vested and became exercisable as of that date. As a

result of these modifications to his share-based payment arrangements, the Company incurred stock compensation expense of $292,000 for the year ended December 31, 2016. This expense was recorded to research and development expense on the Company's consolidated statement of operations.

During 2015, the Company modified certain stock option grants for its former president and chief executive officer in conjunction with his retirement. As part of the January 2015 transition agreement, all outstanding equity awards continued to vest through December 31, 2015, and fifty percent (50%) of the option awards that are unvested on December 31, 2015 immediately vested and became exercisable as of that date. As a result of these modifications to his share-based payment arrangements, the Company incurred stock compensation expense of $826,000 for the year ended December 31, 2015. This expense was recorded to selling, general and administrative expense on the Company's consolidated statement of operations.

The 2012 Plan allows for the granting of incentive and nonqualified options to purchase shares of common stock, restricted stock and other equity awards. Incentive options granted to employees under the Plans generally vest over a three to five-year period, with 20%-33% vesting on the first anniversary of the date of grant and the remainder vesting in equal yearly installments thereafter. Nonqualified options issued to non-employee directors and consultants under the Plans generally vest over one year. Options granted under the Plans have a maximum term of ten years from the date of grant and generally, the exercise price of the stock options equals the fair market value of the Company's common stock on the date of grant. At December 31, 2017, options to purchase 734,940 shares and 505,235 restricted stock units were outstanding under the Plans. At December 31, 2017, 1,220,915 shares were available for future grant under the 2012 Plan.

The Company uses the Black-Scholes option pricing model to calculate the fair value of share-based awards on the grant date. The fair value of share-based awards granted during the years ended December 31, 2017, 2016 and 2015 were calculated using the following estimated assumptions:

	2017	2016	2015
Expected term (years)	6.1	6.7 – 7.1	6.6 – 7.2
Volatility	51.48%	50.85 – 51.01%	50.09 – 51.89%
Risk-free interest rate	1.88 – 1.99%	1.51 – 2.37%	1.67 – 2.03%
Expected dividend yield	—	—	—

Information regarding option activity for the year ended December 31, 2017 under the Plans is summarized below:

	Options Outstanding	Weighted-Average Exercise Price Per Share	Weighted-Average Remaining Contractual Term (in years)	(in thousands) Aggregate Intrinsic Value
Options outstanding at December 31, 2016	882,748	$16.88		
Granted	101,844	33.38		
Exercised	(215,495)	10.92		
Forfeited/cancelled	(34,157)	20.23		
Options outstanding at December 31, 2017	734,940	$20.80	6.46	$11,558
Options exercisable at December 31, 2017	420,688	$15.86	5.28	$ 8,720
Vested and expected to vest at December 31, 2017[1]	727,278	$20.71	6.44	$11,472

(1) Represents the number of vested options as of December 31, 2017 plus the number of unvested options expected to vest as of December 31, 2017 based on the unvested outstanding options at December 31, 2017 adjusted for estimated forfeiture rates of 8% for awards granted to non-executive level employees and 3% for awards granted to executive level employees.

The aggregate intrinsic value in the table above represents the total pre-tax intrinsic value (the difference between the closing price of the common stock on December 29, 2017, the last business day of 2017, of $36.28 per share and the exercise price of each in-the-money option) that would have been received by the option holders had all option holders exercised their options on December 31, 2017. The aggregate intrinsic value of stock options exercised during the years ended December 31, 2017, 2016 and 2015 was approximately $5,305,000, $5,043,000 and $3,638,000, respectively.

The weighted average grant date fair value of options granted during the years ended December 31, 2017, 2016 and 2015 was $16.94, $14.16 and $16.05, respectively. The total fair value of stock options that vested during the years ended December 31, 2017, 2016 and 2015 was approximately $2,220,000, $1,713,000 and $1,536,000, respectively.

Information regarding restricted stock unit activity for the year ended December 31, 2017 under the Plans is summarized below:

	Options Outstanding	Weighted-Average Remaining Contractual Term (in years)	(in thousands) Aggregate Intrinsic Value
Restricted stock units outstanding at December 31, 2016	353,838		
Granted	293,004		
Vested	(114,690)		
Forfeited/cancelled	(26,917)		
Restricted stock units outstanding at December 31, 2017	505,235	2.65	$18,330
Vested and expected to vest at December 31, 2017[(1)]	466,201	2.40	$16,914

(1) Represents the number of vested restricted stock units as of December 31, 2017 plus the number of unvested restricted stock units expected to vest as of December 31, 2017 based on the unvested outstanding restricted stock units at December 31, 2017 adjusted for estimated forfeiture rates of 8% for awards granted to non-executive level employees and 3% for awards granted to executive level employees.

The aggregate intrinsic value in the table above represents the total pre-tax intrinsic value (equal to the closing price of the common stock on December 29, 2017, the last business day of 2017, of $36.28 per share, as restricted stock units do not have an exercise price) that would have been received by the restricted stock unit holders had all holders exercised on December 31, 2017. The aggregate intrinsic value of restricted stock units vested during the years ended December 31, 2017, 2016 and 2015 was approximately $4,010,000, $1,671,000 and $1,304,000, respectively.

The weighted average grant date fair value of restricted stock units granted during the years ended December 31, 2017, 2016 and 2015 was $26.03, $27.25 and $29.07, respectively. The total fair value of restricted stock units that vested during the years ended December 31, 2017, 2016 and 2015 was approximately $4,010,000, $1,474,000 and $781,000, respectively.

As of December 31, 2017, there was $16,133,000 of total unrecognized compensation cost related to unvested share-based awards. This cost is expected to be recognized over a weighted average remaining requisite service period of 2.52 years. The Company expects 772,791 unvested options and restricted stock units to vest over the next five years.

6. Commitments and Contingencies

Lease Commitments

In 2001, the Company entered into a ten-year lease agreement for approximately 25,000 square feet of space located in Waltham, Massachusetts to be used for its corporate headquarters, manufacturing, research and development, and marketing and administrative operations. In July 2011, the Company amended this agreement to expand the lease to cover approximately 55,694 square feet and to extend the term of the lease by eleven years, which expires on May 31, 2023. In connection with this lease agreement, the Company issued a letter of credit in the amount of $200,000 to the lessor in lieu of a security deposit. The letter of credit is collateralized by a certificate of deposit held by the bank that issued the letter of credit. The certificate of deposit is classified as restricted cash in the accompanying consolidated balance sheets.

In March 2014, the Company entered into an amendment of its existing lease to expand the rented space from 55,694 to 75,594 square feet at 41 Seyon Street, Waltham, Massachusetts. Pursuant to the terms of the amended lease, Repligen leased an additional 19,900 square feet (the "Expansion Space") for a period of eight years and one month, commencing on August 1, 2014.

The amended lease provides for additional rent expense of approximately $361,000 on an annualized basis. The amended lease also required an increase to the letter of credit from $200,000 to $450,000 and continues to require the Company to pay a proportionate share of certain of the landlord's annual operating costs and real estate taxes. In 2017, the issuing bank no longer required collateral to secure the letter of credit; as a result, the Company released the funds from restricted cash. Future minimum rental commitments under the amended lease as of December 31, 2017 are $1,371,000 for the years ending December 31, 2018, 2019, 2020 and 2021, respectively and $1,251,000 for the year ended December 31, 2022.

In 2007, the Company entered into a five-year lease agreement for approximately 2,500 square feet of space in Waltham, Massachusetts to provide for expanded manufacturing operations. Adjacent to this space, the Company entered into a two-year lease in 2008 for approximately 7,350 square feet of additional space to be used for expanded manufacturing and administrative operations. Both of these leases expired on December 31, 2012. The Company converted to a month-to-month basis for both sites. The Company terminated the lease on the 7,350 square feet of space in the first quarter of 2015.

The Company leases four adjacent buildings in Lund, Sweden totaling approximately 45,000 square feet of space used primarily for biologics manufacturing and administrative operations. The lease was renewed during 2016 and expires on December 31, 2021. Future minimum rental commitments under the amended lease as of December 31, 2017 are $1,087,000 for the years ending December 31, 2018, 2019, 2020 and 2021, respectively.

Obligations under non-cancelable operating leases, including the facility leases discussed above, as of December 31, 2017 are approximately as follows (in thousands):

Years Ending	Operating Leases
December 31, 2018	3,611
December 31, 2019	3,383
December 31, 2020	3,077
December 31, 2021	2,750
December 31, 2022	1,464
Thereafter	786
Minimum lease payments	$15,071

Rent expense charged to operations under operating leases was approximately $3,367,000, $2,644,000 and $2,619,000 for the fiscal years ended December 31, 2017, 2016 and 2015, respectively. As of December 31,

2017, 2016 and 2015, the Company had deferred rent liabilities of $1,656,000, $1,792,000 and $1,899,000, respectively, related to the escalating rent provisions for the Waltham headquarters and the Company's facility in Rancho Dominguez, California.

Licensing and Research Agreements

The Company licenses certain technologies that are, or may be, incorporated into its technology under several agreements and also has entered into several clinical research agreements which require the Company to fund certain research projects. Generally, the license agreements require the Company to pay annual maintenance fees and royalties on product sales once a product has been established using the technologies. The Company recorded research and development expenses associated with license agreements of approximately $161,000, $5,000 and $7,000 for the years ended December 31, 2017, 2016 and 2015, respectively.

In October 2009, the Company entered into an exclusive worldwide commercial license agreement with Families of Spinal Muscular Atrophy (see Note 2). Pursuant to the License Agreement dated December 28, 2012, the Company transferred all rights and obligations related to the FSMA License Agreement to Pfizer. The License Agreement was terminated by Pfizer, effective as of April 26, 2015.

Purchase Orders, Supply Agreements and Other Contractual Obligations

In the normal course of business, the Company has entered into purchase orders and other agreement with manufacturers, distributors and others. Outstanding obligations at December 31, 2017 of approximately $15,512,000 are expected to be completed within one year.

7. Prepaid Expenses and Other Current Assets

Prepaid expenses and other current assets consist of the following (in thousands):

	December 31, 2017	December 31, 2016
Equipment maintenance and services	$1,091	$ 586
Prepaid taxes	311	626
Prepaid insurance	594	356
Deferred costs	67	5
Other	218	71
Total	$2,281	$1,644

8. Property, Plant and Equipment

Property, plant and equipment consist of the following (in thousands):

	December 31, 2017	December 31, 2016
Land	$ 1,023	$ —
Buildings	764	—
Leasehold improvements	15,673	14,592
Equipment	21,904	15,214
Furniture and fixtures	4,272	3,218
Construction in progress	2,581	1,264
Total property, plant and equipment	46,217	34,288
Less: accumulated depreciation	(23,800)	(19,332)
Property, plant and equipment, net	$ 22,417	$ 14,956

Depreciation expense totaled approximately $4,237,000, $3,269,000 and $2,996,000 in the fiscal years ended December 31, 2017, 2016 and 2015, respectively.

9. Accrued Liabilities

Accrued liabilities consist of the following (in thousands):

	December 31, 2017	December 31, 2016
Employee compensation	$ 9,560	$ 5,586
Taxes	1,668	1,692
Royalty and license fees	1,383	248
Contingent consideration	—	6,119
Accrued purchases	1,191	382
Professional fees	947	411
Unearned revenue	960	408
Other accrued expenses	2,220	1,168
Total	$17,929	$16,014

10. Convertible Senior Notes

The carrying value of the Company's convertible senior notes is as follows:

	December 31, 2017	December 31, 2016
2.125% Convertible Senior Notes due 2021:		
Principal amount	$115,000	$115,000
Unamortized debt discount	(13,395)	(16,777)
Unamortized debt issuance costs	(2,355)	(2,951)
Total convertible senior notes	$ 99,250	$ 95,272

On May 24, 2016, the Company issued $115 million aggregate principal amount of its 2.125% Convertible Senior Notes due 2021 (the "Notes"). The net proceeds from the sale of the Notes, after deducting the underwriting discounts and commissions and other related offering expenses, were approximately $111.1 million. The Notes bear interest at the rate of 2.125% per annum, payable semiannually in arrears on June 1 and December 1 of each year, beginning on December 1, 2016.

The Notes will mature on June 1, 2021, unless earlier repurchased, redeemed or converted in accordance with their terms. Prior to March 1, 2021, the Notes will be convertible at the option of holders of the Notes only upon satisfaction of certain conditions and during certain periods, and thereafter, the notes will be convertible at any time until the close of business on the second scheduled trading day immediately preceding the maturity date. Upon conversion, holders of the Notes will receive shares of the Company's common stock, cash or a combination thereof, at the Company's election. It is the Company's current intent and policy to settle all conversions through combination settlement, which involves satisfying the principal amount outstanding with cash and any note conversion value over the principal amount in shares of the Company's common stock.

During the third quarter of 2017, the closing price of the Company's common stock exceeded 130% of the conversion price of the Notes for more than 20 trading days of the last 30 consecutive trading days of the quarter. As a result, the Notes were convertible at the option of the holders of the Notes during the fourth quarter of 2017 and were classified as a current liability on our September 30, 2017 consolidated balance sheet. Notes with a par value of $11,000 were submitted for conversion in the fourth quarter of 2017; this conversion was settled in the

first quarter of 2018. During the fourth quarter of 2017, the closing price of the Company's common stock did not exceed 130% of the conversion price of the Notes for more than 20 trading days of the last 30 consecutive trading days of the quarter. As a result, the Notes are not convertible in the first quarter of 2018 and are classified as long term liabilities on the Company's consolidated balance sheet as of December 31, 2017. In the event the closing price conditions are met in a future fiscal quarter, the Notes will be convertible at a holder's option during the immediately following fiscal quarter. As of December 31, 2017, the if-converted value of the Notes exceeded the aggregate principal amount by approximately $34.5 million.

The conversion rate for the Notes will initially be 31.1813 shares of the Company's common stock per $1,000 principal amount of Notes, which is equivalent to an initial conversion price of approximately $32.07 per common share, and is subject to adjustment under the terms of the Notes. Holders of the Notes may require the Company to repurchase their Notes upon the occurrence of a fundamental change prior to maturity for cash at a repurchase price equal to 100% of the principal amount of the Notes to be repurchased plus accrued and unpaid interest, if any, to, but excluding, the repurchase date.

The Company will not have the right to redeem the Notes prior to June 5, 2019, but may redeem the Notes, at its option, in whole or in part, on any business day on or after June 5, 2019 and prior to the maturity date if the last reported sale price of the Company's common stock has been at least 130% of the conversion price then in effect for at least 20 trading days (whether or not consecutive) during any 30 consecutive trading day period ending on, and including, the trading day immediately preceding the date on which the Company provides written notice of redemption. The redemption price will be equal to 100% of the principal amount of the principal amount of Notes to be redeemed plus accrued and unpaid interest to, but excluding, the redemption date.

The Notes contain customary terms and events of default. If an event of default (other than certain events of bankruptcy, insolvency or reorganization involving the Company) occurs and is continuing, the holders of at least 25% in aggregate principal amount of the outstanding Notes may declare 100% of the principal of, and any accrued and unpaid interest on, all of the Notes to be due and payable. Upon the occurrence of certain events of bankruptcy, insolvency or reorganization involving the Company, 100% of the principal of and accrued and unpaid interest, if any, on all of the Notes will become due and payable automatically. Notwithstanding the foregoing, the Notes provide that, to the extent the Company elects and for up to 270 days, the sole remedy for an event of default relating to certain failures by the Company to comply with certain reporting covenants consist exclusively of the right to receive additional interest on the Notes. The Company is not aware of any events of default, current events or market conditions that would allow holders to call or convert the Notes as of December 31, 2017, except as noted above.

The cash conversion feature of the Notes required bifurcation from the Notes and was initially accounted for as an equity instrument classified to stockholders' equity, as the conversion feature was determined to be clearly and closely related to the Company's stock. Based on market data available for publicly traded, senior, unsecured corporate bonds issued by companies in the same industry and asset base and with similar maturity, the Company estimated the implied interest rate, assuming no conversion option. Assumptions used in the estimate represent what market participants would use in pricing the liability component, including market interest rates, credit standing, and yield curves, all of which are defined as Level 2 observable inputs. The estimated implied interest rate was applied to the Notes, which resulted in a fair value of the liability component of $96,289,000 upon issuance, calculated as the present value of implied future payments based on the $115 million aggregate principal amount. The equity component of the Notes was recognized as a debt discount, recorded in additional paid-in capital, and represents the difference between the aggregate principal of the Notes and the fair value of the Notes without conversion option on their issuance date. The debt discount is amortized to interest expense using the effective interest method over five years, or the life of the Notes. The Company assesses the equity classification of the cash conversion feature quarterly, and it is not remeasured as long as it continues to meet the conditions for equity classification.

Interest expense recognized on the Notes during the year ended December 31, 2017 includes $2,444,000, $3,382,000 and $595,000 for the contractual coupon interest, the accretion of the debt discount and the

amortization of the debt issuance costs, respectively. Interest expense recognized on the Notes during the year ended December 31, 2016 includes $1,473,000, $1,934,000 and $340,000 for the contractual coupon interest, the accretion of the debt discount and the amortization of the debt issuance costs, respectively. The effective interest rate on the Notes is 6.6%, which includes the interest on the Notes, amortization of the debt discount and debt issuance costs. As of December 31, 2017, the carrying value of the Notes was approximately $99.3 million and the fair value of the principal was approximately $149.5 million. The fair value of the Notes was determined based on the most recent trade activity of the Notes as of December 31, 2017.

11. Accumulated Other Comprehensive Income (Loss)

Changes in accumulated other comprehensive income (loss) consisted of the following for the years ended December 31, 2017 and 2016 (in thousands):

	Unrealized gain (loss) on investments	Foreign currency translation adjustment	Total
Balance as of December 31, 2015	$ (11)	$ (8,555)	$ (8,566)
Other comprehensive income (loss)	6	(5,189)	(5,183)
Balance as of December 31, 2016	(5)	(13,744)	(13,749)
Other comprehensive income (loss)	5	7,381	7,386
Balance as of December 31, 2017	$—	$ (6,363)	$ (6,363)

12. Employee Benefit Plans

In the U.S., the Repligen Corporation 401(k) Savings and Retirement Plan (the "401(k) Plan") is a qualified defined contribution plan in accordance with Section 401(k) of the Internal Revenue Code. All U.S. employees over the age of 21 are eligible to make pre-tax contributions up to a specified percentage of their compensation. Under the 401(k) Plan, the Company may, but is not obligated to match a portion of the employees' contributions up to a defined maximum. The match is calculated on a calendar year basis. The Company matched approximately $451,000, $184,000 and $141,000 in the fiscal years ended December 31, 2017, 2016 and 2015, respectively.

In Sweden, the Company contributes to a government-mandated occupational pension plan that is a qualified defined contribution plan. All employees in Sweden are eligible for this pension plan. The Company pays premiums to a third party occupational pension specialist who administers the pension plan. These premiums are based on various factors including each employee's age, salary, employment history and selected benefits in the pension plan. When an employee terminates or retires, these premium payments cease for that employee and the Company has no further pension-related obligations for that employee. For the fiscal years ended December 31, 2017, 2016 and 2015, the Company contributed approximately $539,000, $519,000 and $485,000, respectively, to the pension plan.

13. Related Party Transactions

In July 2017, in conjunction with the Spectrum Acquisition, the Board of Directors engaged one of the Company's independent directors to serve as the chairperson of the Spectrum Integration Committee. In this role, this Director will work directly with the Company's executive team on general integration strategy and focus on the integration of Spectrum's operations and commercial organization with the Company. The Company has recorded approximately $190,000 of expense for the year ended December 31, 2017 related to this director's services.

Additionally, certain facilities leased by Spectrum are owned by the former owner of Spectrum, who currently holds greater than 10% of the Company's outstanding common stock. The lease amounts paid to this shareholder

were negotiated in connection with the Spectrum Acquisition. The Company has incurred rent expense totaling $334,000 for the year ended December 31, 2017 related to these leases.

14. Selected Quarterly Financial Data (Unaudited)

The following table contains consolidated statements of operations information for each of the previous eight quarters. The Company believes that the following information reflects all normal recurring adjustments necessary for a fair presentation of the information for the periods presented. The operating results for any quarter are not necessarily indicative of results for any future period.

	December 31, 2017	September 30, 2017	June 30, 2017	March 31, 2017	December 31, 2016	September 30, 2016	June 30, 2016	March 31, 2016
	(in thousands, except per share amounts)							
Revenue:								
Product revenue	$ 41,572	$36,514	$32,434	$30,569	$25,500	$24,677	$29,170	$25,094
Royalty and other revenue	39	66	21	21	100	—	—	—
Total revenue	41,611	36,580	32,455	30,590	25,600	24,677	29,170	25,094
Operating expenses:								
Cost of product revenue	19,136	19,987	13,937	13,990	12,162	11,242	12,644	11,069
Research and development	3,069	2,001	1,860	1,742	2,040	1,886	1,890	1,539
Selling, general and administrative	16,144	14,998	11,185	9,182	8,568	7,127	8,140	7,018
Contingent consideration – fair value adjustments	—	—	—	—	(75)	675	637	2,005
Total operating expenses	38,349	36,986	26,982	24,914	22,695	20,930	23,311	21,631
Income (loss) from operations	3,262	(406)	5,473	5,676	2,905	3,747	5,859	3,463
Investment income	63	102	110	96	112	97	76	61
Interest expense	(1,637)	(1,618)	(1,601)	(1,585)	(1,570)	(1,555)	(638)	(5)
Other income (expense)	(139)	(100)	(328)	(120)	119	(75)	75	(979)
Income (loss) before income taxes	1,549	(2,022)	3,654	4,067	1,566	2,214	5,372	2,540
Income tax provision (benefit)	(10,629)	(6,691)	(4,784)	999	(3,463)	1,059	1,500	915
Net income (loss)	$ 12,178	$ 4,669	$ 8,438	$ 3,068	$ 5,029	$ 1,155	$ 3,872	$ 1,625
Earnings per share:								
Basic	$ 0.28	$ 0.11	$ 0.25	$ 0.09	$ 0.15	$ 0.03	$ 0.12	$ 0.05
Diluted	$ 0.27	$ 0.11	$ 0.24	$ 0.09	$ 0.15	$ 0.03	$ 0.11	$ 0.05
Weighted average shares outstanding:								
Basic	43,569	41,237	34,098	33,892	33,833	33,779	33,649	33,025
Diluted	44,385	42,563	35,095	34,382	34,369	34,313	34,175	33,494

Board of Directors

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Chairperson, Board of Directors
President, Knowledgeable Decisions, LLC

Nicolas M. Barthelemy
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Global Commercial Operations,
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and Field Applications

Anthony MacDonald
Senior Vice President,
Spectrum

Stephen Tingley
Vice President, Sales

Investor Information

Copies of our annual reports on Form 10-K, proxy statements, quarterly reports on Form 10-Q and current reports on Form 8-K are available to stockholders upon request without charge. Please visit our website at www.repligen.com or direct requests to:

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ATTN: Investor Relations
Phone: 781.250.0111
investors@repligen.com

Market for Repligen Stock

NASDAQ Global Market Common Stock: RGEN

Transfer Agent and Registrar

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info@amstock.com

The Transfer Agent is responsible for handling shareholder questions regarding lost certificates, address changes and change of ownership or name in which shares are held.

Corporate Counsel

Goodwin Procter LLP
100 Northern Avenue
Boston, MA 02210

Independent Accountants

Ernst & Young LLP
200 Clarendon Street
Boston, MA 02116

Annual Meeting

The Annual Meeting of Stockholders will be held on Wednesday, May 16, 2018, 8:00 a.m. ET, at Repligen Corporation's headquarters:
41 Seyon Street,
Building #1, Suite 100
Waltham, MA 02453

Repligen Corporation
41 Seyon Street, Building 1, Suite 100, Waltham, MA 02453
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