

ION GEOPHYSICAL CORP
Form 10-K
February 09, 2017

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549

Form 10-K

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the Fiscal Year Ended December 31, 2016

or

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

Commission file number 1-12691

ION Geophysical Corporation

(Exact Name of Registrant as Specified in Its Charter)

Delaware

22-2286646

(State or Other Jurisdiction of Incorporation or Organization) (I.R.S. Employer Identification No.)

2105 CityWest Blvd

Suite 100

Houston, Texas 77042-2839

(Address of Principal Executive Offices, Including Zip Code)

(281) 933-3339

(Registrant's Telephone Number, Including Area Code)

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

Title of Each Class	Name of Each Exchange on Which Registered
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Common Stock, \$0.01 par value	New York Stock Exchange
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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 Exchange Act Yes No

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

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained 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" and "smaller reporting company" in Rule 12b-2 of the Exchange Act. (Check one):

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

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

As of June 30, 2016 (the last business day of the registrant's second quarter of fiscal 2016), the aggregate market value of the registrant's common stock held by non-affiliates of the registrant was \$69.2 million based on the closing sale price per share (\$6.23) on such date as reported on the New York Stock Exchange.

As of February 6, 2017, the number of shares of common stock, \$0.01 par value, outstanding was 11,792,446 shares.

DOCUMENTS INCORPORATED BY REFERENCE

Document	Parts Into Which Incorporated
Portions of the registrant's definitive Proxy Statement for its Annual Meeting of Stockholders scheduled to be held on May 17, 2017, to be filed pursuant to Regulation 14A	Part III

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PART I

Preliminary Note: This Annual Report on Form 10-K contains “forward-looking statements” as that term is defined in the Private Securities Litigation Reform Act of 1995. Forward-looking statements should be read in conjunction with the cautionary statements and other important factors included in this Form 10-K. See Item 1A. “Risk Factors” for a description of important factors which could cause actual results to differ materially from those contained in the forward-looking statements.

In this Form 10-K, “ION Geophysical,” “ION,” “the company” (or, “the Company”), “we,” “our,” “ours” and “us” refer to ION Geophysical Corporation and its consolidated subsidiaries, except where the context otherwise requires or as otherwise indicated. Certain trademarks, service marks and registered marks of ION referred to in this Form 10-K are defined in Item 1. “Business — Intellectual Property.”

Item 1. Business

ION is a Delaware corporation. Our predecessor entity was incorporated in 1979. We are a global, technology-focused company that provides geoscience products, services and solutions to the global oil and gas industry. Our offerings are designed to allow oil and gas exploration and production (“E&P”) companies to obtain higher resolution images of the Earth’s subsurface to reduce their risk in hydrocarbon exploration and development. We acquire, process and interpret seismic data from seismic surveys on a multi-client or proprietary basis. Seismic surveys for our multi-client data library business are pre-funded, or underwritten, in part by our customers, and, with the exception of our ocean bottom seismic (“OBS”), an ocean bottom data acquisition services company, OceanGeo B.V. (“OceanGeo”), we contract with third party seismic data acquisition companies to acquire the seismic data, all of which is intended to minimize our risk exposure. We serve customers in most major energy producing regions of the world from strategically located offices in 28 cities on six continents.

Seismic imaging plays a fundamental role in hydrocarbon exploration and reservoir development by delineating structures, rock types and fluid locations in the subsurface. Our technologies, services and solutions are used by E&P companies to generate high-resolution images of the Earth’s subsurface to identify hydrocarbons and pinpoint drilling locations for wells.

We provide our services and products through three business segments – E&P Technology & Services, E&P Operations Optimization, and Ocean Bottom Services. Our Ocean Bottom Services segment is comprised of OceanGeo, in which we increased our ownership to 100% in 2014. In addition, we have a 49% ownership interest in our INOVA Geophysical Equipment Limited joint venture (“INOVA Geophysical,” or “INOVA”).

For decades we have provided innovative seismic data acquisition technology, such as multicomponent imaging with VectorSeis® products, the ability to record seismic data from basins below ice in the Arctic, and cableless seismic techniques. The advanced technologies we currently offer include our Orca® and Gator™ command and control software systems, WiBand® broadband data processing technology, Calypso™ OBS acquisition system, Marlin™ simultaneous operations solution and other technologies, each of which is designed to deliver improvements in image quality, productivity and/or safety. We have approximately 500 patents and pending patent applications in various countries around the world. Approximately 48% of our employees are involved in technical roles and over 25% of our employees have advanced degrees.

In August 2016, we announced our plans to restructure our four business segments into three. Beginning in the third quarter of 2016, we changed our reportable segments as described below:

- E&P Technology & Services, formerly referred to as Solutions, continues to be comprised of the groups that support our New Venture and Data Library (together multi-client) revenues and Imaging Services group.
- E&P Operations Optimization is comprised of Devices, formerly referred to as Systems, and Optimization Software & Services, formerly referred to as Software. The manufacturing, engineering, research and development of ocean bottom systems is no longer a part of Devices, and is now within Ocean Bottom Services as noted below.
- Ocean Bottom Services is comprised of OceanGeo, an ocean bottom data acquisition services company along with the manufacturing, engineering, research and development of ocean bottom systems.

We believe our new three-segment structure is aligned with our strategy of developing and leveraging innovative technologies to deliver solutions that address oil and gas companies’ most challenging problems throughout the E&P

lifecycle. As a result of this move, our results of operations, management's discussion and analysis, and other applicable sections herein have been recast to reflect this change for all periods presented.

E&P Technology & Services. Our E&P Technology & Services business provides three distinct service activities that often work together.

Our E&P Technology & Services business focuses on providing services and products for complex and hard-to-image geologies, such as deepwater subsalt formations in the Gulf of Mexico and offshore East and West Africa and Brazil; unconventional reservoirs, such as those found onshore in shale, tight gas and oil sands formations; and offshore basin-wide seismic data and imaging programs. Since 2002, our basin exploration seismic data programs have resulted in over 500,000 km of data library that covers significant portions of many of the basins in the world, including offshore East and West Africa, South America, the Arctic, the Gulf of Mexico and Australia.

Our Ventures group (formerly known as our GeoVentures group) provides services designed to manage the entire seismic process, from survey planning and design to data acquisition and management through subsurface imaging and reservoir characterization. Our Ventures group focuses on the geologically intensive components of the image development process, such as survey planning and design, and data processing and interpretation, outsourcing the logistics components (such as field acquisition) to experienced seismic and other geophysical contractors.

Our Imaging Services group (formerly known as our GX Technology (GXT) group) offers data processing and imaging services designed to help our E&P customers reduce exploration and production risk, evaluate and develop reservoirs, and increase production. We maintain more than 17 petabytes of seismic data digital information storage in 4 global data centers, including two core data centers located in Houston and in the U.K.

Our E&P Advisors group partners with E&P operators, energy industry regulators and capital institutions to capture and monetize E&P opportunities worldwide. This group provides technical, commercial and strategic advice across the E&P value chain, working at basin, prospect and field scales.

E&P Operations Optimization. Our E&P Operations Optimization business combines our Optimization Software & Services and Devices offerings.

Our Optimization Software & Services business provides command and control software systems, related software and services for towed marine streamer and ocean bottom seismic operations, as well as survey design. Our Orca software system is installed on towed streamer vessels worldwide, and our Gator software is used on many ocean bottom seismic surveys.

Our Marlin solution is aimed at optimizing simultaneous operations during all phases of an offshore asset's lifecycle, from exploration, through appraisal, development and production.

Our Devices business is engaged in the manufacture and repairs of marine towed streamer acquisition and positioning systems and analog geophone sensors.

Ocean Bottom Services ("OBS"). In 2014, we increased our ownership interest in OceanGeo to 100%. Through the addition of OceanGeo, ION offers a fully integrated OBS solution designed to maximize seismic image quality, operational efficiency and safety. The integrated OBS solution includes expert survey design, planning and optimization, superior data captured using multicomponent acquisition systems available exclusively to OceanGeo; data acquisition by the experienced team at OceanGeo; and data processing, interpretation and reservoir services, by our Imaging Services experts. In addition, OceanGeo is engaged in the manufacture of redeployable ocean bottom cable seismic data acquisition systems.

INOVA Geophysical. We conduct our land seismic equipment business through INOVA Geophysical, a joint venture with BGP Inc., a subsidiary of China National Petroleum Corporation ("CNPC"). BGP is generally regarded as the world's largest land geophysical service contractor. BGP owns a 51% equity interest in INOVA Geophysical, and we own the remaining 49% interest. INOVA manufactures cable-based and cableless seismic data acquisition systems, digital sensors, vibroseis vehicles (i.e., vibrator trucks), and source controllers for detonator and energy source business lines. We wrote our investment in INOVA down to zero as of December 31, 2014. For a discussion of the impairment of our equity method investment in INOVA, see Footnote 15 "Equity Method Investments" of Footnotes to Consolidated Financial Statements contained elsewhere in this Annual Report on Form 10-K.

Seismic Industry Overview

1930s – 1970s. Since the 1930s, oil and gas companies have sought to reduce exploration risk by using seismic data to create an image of the Earth's subsurface. Seismic data is recorded when listening devices placed on the Earth's surface or ocean bottom floor, or carried within the streamer cable of a towed streamer vessel, measure how long it takes for

sound vibrations to echo off rock layers underground. For seismic data acquisition onshore, the acoustic energy producing the sound vibrations is generated by the detonation of small explosive charges or by large vibroseis (vibrator) vehicles. In marine acquisition, the energy is provided by a series of arrays that deliver compressed air into the water column.

The acoustic energy propagates through the subsurface as a spherical wave front, or seismic wave. Interfaces between different types of rocks will both reflect and transmit this wave front. Onshore, the reflected signals return to the surface where they are measured by sensitive receivers that are analog coil-spring geophones. Offshore, the reflected signals are recorded by either hydrophones towed in an array behind a streamer acquisition vessel or by multicomponent geophones or MEMS sensors that are placed directly on the ocean floor. Once the recorded seismic energy is processed using advanced algorithms and workflows, images of the subsurface can be created to depict the structure, lithology (rock type), fracture patterns, and fluid content of subsurface horizons, highlighting the most promising places to drill for oil and natural gas. This processing also aids in engineering decisions, such as drilling and completion methods, as well as decisions affecting overall reservoir production as well as guiding economic decisions relating to drilling risk and reserves in place.

Typically, an E&P company engages the services of a geophysical acquisition contractor to prepare site locations, coordinate logistics, and acquire seismic data in a selected area. The E&P company generally relies on third parties, such as ION, to provide the contractor with equipment, navigation and data management software, and field support services necessary for data acquisition. After the data is collected, the same geophysical contractor, a third-party data processing company, our Imaging Services group or the E&P company itself will process the data using proprietary algorithms and workflows to create a series of seismic images. Geoscientists then interpret the data by reviewing the images and integrating the geophysical data with other geological and production information such as well logs or core information.

During the 1960s, digital seismic data acquisition systems (which converted the analog output from the geophones into digital data for recording) and computers for seismic data processing were introduced. Using the new systems and computers, the signals could be recorded on magnetic tape and sent to data processors where they could be adjusted and corrected for known distortions. The final processed data was displayed in a form known as “stacked” data. Computer filing, storage, database management, and algorithms used to process the raw data quickly grew more sophisticated, dramatically increasing the amount of subsurface seismic information.

1980s. Until the early 1980s, the primary commercial seismic imaging technology was two-dimensional (“2-D”) technology. 2-D seismic data is recorded using lines of receivers crossing the surface of the Earth. Once processed, 2-D seismic data allows geoscientists to see only a thin vertical slice of the Earth, and that image may be corrupted by reflections originating out of the plane of the receiver line. A geoscientist using 2-D seismic technology must speculate on the characteristics of the Earth between the slices and attempt to visualize the true three-dimensional (“3-D”) structure of the subsurface.

The commercial development of 3-D imaging technology in the early 1980s was an important technological milestone for the seismic industry. Previously, the high cost of 3-D seismic data acquisition techniques and the lack of computing power necessary to process, display, and interpret 3-D data on a commercial basis slowed its widespread adoption. Today’s 3-D seismic techniques record the reflected energy across a series of closely-spaced seismic lines that collectively provide a more holistic, spatially-sampled depiction of geological horizons and, in some cases, rock and fluid properties, within the Earth.

3-D seismic data and the associated computer-based interpretation platforms enable geoscientists to generate more accurate subsurface maps than could be constructed from 2-D seismic lines. In particular, 3-D seismic data provided more detailed information about and higher-quality images of subsurface structures, including the geometry of bedding layers, salt structures, and fault planes. The improved 3-D seismic images allowed the oil and gas industry to discover new reservoirs, reduce finding and development costs, and lower overall hydrocarbon exploration risk. Driven by faster computers and more sophisticated mathematical equations to process the data, the technology advanced quickly.

1990s. As commodity prices decreased in the late 1990s and the pace of innovation in 3-D seismic imaging technology slowed, E&P companies slowed the commissioning of new seismic surveys. Also, business practices employed by geophysical contractors impacted demand for seismic data. In an effort to sustain higher utilization of existing capital assets, geophysical contractors increasingly began to collect speculative seismic data for their own libraries in the hopes of selling it later to E&P companies. There became an abundance of speculative multi-client data in many regions. Additionally, since contractors incurred most of the costs of this speculative seismic data at the time

of acquisition, contractors lowered prices to recover as much of their fixed investment as possible, which drove operating margins down. During the 1990's, the accuracy of 3-D seismic surveys improved to the point that a survey acquired after significant oil production could be compared to a pre-production survey, and maps of the drainage pattern of the reservoir could be produced. This technique became known as time lapse, or 4-D seismic. 2000s. The conditions from the 1990s continued to prevail until 2004-2005, when commodity prices began increasing and E&P companies increased capital spending programs, driving higher demand for our services and products. During this time, the use of horizontal drilling and hydraulic fracturing increased, as onshore North American production became economically viable with higher oil prices. These techniques, used to tap unconventional reservoirs, made once "hard to produce" oil and gas accessible and caused an upsurge in North American onshore oil and gas activity.

The financial crisis that occurred in 2008 and the resulting economic downturn drove hydrocarbon prices down sharply, reducing exploration activities in North America and in many parts of the world. Crude oil prices rebounded and were fairly consistent from 2011-2014 exceeding \$100 per barrel, and U.S. oil production surged beyond what even the most optimistic forecasts predicted. In late 2014, however, oil prices began to decline significantly, dropping by approximately half and continued into 2015 as signs emerged that non-U.S. demand was weakening.

Throughout 2014-2016, oil companies prioritized shareholder returns and cash flow generation over hydrocarbon resource growth, minimizing discretionary spending and shifting their focus from exploration to production. This shift caused a contraction in E&P spending, especially on seismic for exploration purposes. In addition, oil and gas companies have tended to shift toward reprocessing existing seismic data as a more cost-effective alternative to acquiring new data.

Our Strategy

The key elements of our business strategy are to:

Leverage our key technologies to provide integrated solutions to oil and gas companies, across the entire E&P lifecycle. More of our customers are seeking fully integrated offerings from seismic companies, from survey planning and design, to leading technology differentiation in acquisition and processing. We have transformed our Company from an equipment provider to an integrated service provider, where leading equipment and software technologies underpin our solution offerings. The growth in our E&P Technology & Services business over the past decade is a testament to our steadfast execution of this strategy. Whereas our E&P Technology & Services offerings, including our BasinSPAN™ 2-D seismic programs, were focused on the earlier frontier exploration phase of the E&P lifecycle, our newest offering, OBS services through OceanGeo, is geared to the later, less volatile, production phase of the E&P lifecycle leveraging our internally developed technology, including Calypso™, our newest OBS data acquisition system.

Expand and globalize our E&P Technology & Services business. We seek to expand and grow our E&P Technology & Services business into new regions, with new customers and new offerings, including data processing services through our Imaging Services group and our Ventures multi-client and proprietary programs. Historically known for our 2-D programs, we entered the 3-D multi-client market in 2014 by acquiring and processing our first survey offshore Ireland. For the foreseeable future, we expect the majority of our near-term investments to be in research and development and computing infrastructure for our data processing business and to support our multi-client projects. We believe this focus better positions our company as a full-service technology company with an increasing proportion of revenues derived from E&P customers.

Continue investing in advanced software and equipment technology to provide next generation services and products. We intend to continue investing in the development of new technologies for use by E&P companies. In particular, we intend to focus on the development of the next generation of our OBS data imaging technology, our Marlin simultaneous operations software, and derivative products, with the goal of obtaining technical and market leadership in what we continue to believe are important and expanding markets. In 2016, our total investment in research and development and engineering was equal to approximately 10% of our total net revenue for the year.

Collaborate with our customers to provide products and solutions designed to meet their needs. A key element of our business strategy has been to understand the challenges faced by E&P companies in seismic survey planning, seismic data acquisition, processing, and interpretation. We will continue to develop and offer technology and services that enable us to work with E&P companies to solve their unique challenges around the world. We have found collaborating with E&P companies to better understand their imaging challenges and working with them to ensure the right technologies are properly applied, is the most effective method for meeting their needs. Our goal of being a full solutions provider to solve the most difficult challenges for our customers is an important element of our long-term business strategy, and we are implementing this partnership approach globally through local personnel in our regional organizations who understand the unique challenges in their areas. We formed an E&P Advisors group in 2015 designed to focus specifically on this element of our strategy.

Our Strengths

We believe that we are solidly positioned to successfully execute the key elements of our business strategy based on the following competitive strengths:

We are leveraging our key technologies to provide integrated solutions to oil and gas companies. More of our customers are seeking fully integrated offerings from seismic companies, from survey planning and design, to leading technology differentiation in acquisition and processing. ION has become an integrated service provider for both towed streamer and ocean bottom seismic services.

We are a broad-based seismic solutions provider, with offerings spanning the entire geophysical workflow. We are a technology-focused service provider, with offerings that span the entire seismic workflow, from survey planning and data acquisition to processing and interpretation. Our offerings include seismic data acquisition hardware, data acquisition services, command and control software, value-added services associated with seismic survey design, seismic data processing and interpretation, and seismic data libraries.

Our “asset light” strategy enables us to avoid significant fixed costs and to remain financially flexible. We do not own a fleet of marine vessels and, with the exception of OceanGeo, we do not provide our own crews to acquire seismic data. We outsource a majority of our seismic data acquisition activity to third parties that operate their own fleets of seismic vessels and equipment. Doing so enables us to avoid fixed costs associated with these assets and personnel and to manage our business in a manner designed to afford us the flexibility to quickly decrease our costs or capital investments in the event of a downturn, as we experienced 2014-2016. We actively manage the costs of developing our multi-client data library business by requiring our customers to partially pre-fund, or underwrite, the investment for any new project. Our target goal is to have a vast majority of the total cost of each new project’s data acquisition to be underwritten by our customers. We believe this conservative approach to data library investment is the most prudent way to reduce the impact of any sudden reduction in the demand for seismic data, giving us the flexibility to aggressively reduce cash outflows as we have successfully implemented in the current industry downturn.

Our global footprint and ability to work in harsh conditions allow us to offset regional downturns. Our focus on conducting business around the world, even in the harshest and most extreme environments, has been and will continue to be a key component of our strategy. This global focus has been helpful in minimizing the impact of any one regional slowdown for short or extended periods of time.

We have a diversified and blue chip customer base. We provide services and products to a diverse, global customer base that includes many of the largest oil and gas and geophysical companies in the world, including national oil companies (NOCs) and international oil companies (IOCs). Over the past decade, we have made significant progress in expanding our customer list and revenue sources. Whereas almost all of our revenues in the early 2000s were derived principally from seismic service providers, in 2016, E&P companies accounted for approximately 75% of our total revenues. Although we provide services and products to some of the largest companies in the world, no single customer accounted for more than 10% of our total revenue in 2014 and 2015; in 2016, we had one customer that exceeded 10% of our total revenue.

Services and Products

E&P Technology & Services Segment

Our E&P Technology & Services segment includes the following:

Ventures — Our Ventures group provides complete seismic data services, from survey planning and design through data acquisition to final subsurface imaging and reservoir characterization. We work backwards through the seismic workflow, with the final image in mind, to select the optimal survey design, acquisition technology, and processing techniques.

We offer our services to customers on both a proprietary and multi-client (non-exclusive) basis. In both cases, the customers generally pre-fund a majority of the survey costs. For proprietary services, the customer has exclusive ownership of the data. For multi-client surveys, we retain ownership of the data and receive ongoing revenue from subsequent data license sales.

Since 2002, we have acquired and processed a growing multi-client data library consisting of non-exclusive marine and ocean bottom data from around the world. The majority of the data licensed by ION consists of ultra-deep 2-D seismic data that E&P companies use to evaluate petroleum systems at the basin level, including insights into the character of source rocks and sediments, migration pathways, and reservoir trapping mechanisms. In many cases, we extend beyond seismic data to include magnetic, gravity, well log, and electromagnetic information, to provide a more comprehensive picture of the subsurface. Known as “BasinSPAN” programs, these geophysical surveys cover most major offshore basins worldwide and we continue to build on them. In addition to our 2-D multi-client programs, in 2013, we acquired our first 3-D marine proprietary program, then in 2014, in collaboration with Polarcus Limited, a marine geophysical company, we jointly acquired and processed our first 3-D survey offshore Ireland.

In 2016, in collaboration with Schlumberger WesternGeco we began a 3-D multicient broadband reimaging program offshore Mexico, which uses Mexico's National Hydrocarbons Commission (CNH) data library. The Campeche program, which consists of three survey areas covering approximately 82,000 km² offshore southern Mexico, makes up a significant portion of our backlog at December 31, 2016.

We also have a library of 3-D onshore reservoir imaging and characterization programs that provide E&P companies with the ability to better understand unconventional reservoirs to maximize production. Known as “ResSCAN™” programs, these 3-D multicomponent seismic data programs were designed, acquired and depth-imaged using advanced geophysical technology and proprietary processing techniques, resulting in high-definition images of the subsurface.

In 2014, we wrote down the value of our multi-client data library, primarily associated with Arctic and onshore North American programs by \$100.1 million due to market conditions. The decline in crude oil prices to 12-year lows negatively impacted the economic outlook of our E&P customers. In response to the decline in crude oil prices, E&P companies significantly reduced spending, with exploration spending receiving the largest reductions and seismic spending being one of the most discretionary parts of their exploration budgets. These reductions in exploration spending have had an impact on our results of operations in 2014-2016.

Imaging Services — Our Imaging Services group provides advanced marine and land seismic data processing and imaging. In addition to applying processing and imaging technologies to data owned or licensed by its customers, we also provide our customers with seismic data acquisition support services, such as data pre-conditioning for imaging and quality control of seismic data acquisition.

We utilize a globally distributed network of Linux-cluster processing centers in combination with our major hubs in Houston and London to process seismic data using advanced, proprietary algorithms and workflows.

Our Imaging Services team has pioneered several differentiated processing and imaging solutions for both offshore and onshore environments including: Reverse Time Migration (RTM), Surface Related Multiple Elimination (SRME), and WiBand broadband deghosting. In 2013, we commercially released our Full Waveform Inversion and non-parametric picking tomography techniques to improve subsurface image resolution in areas with complex geologies. The advantages of these techniques are that they allow for the resolution of complex, small-scale velocity variations. In 2014, we introduced PrecisION™, an innovative compressed seismic inversion technique that is designed to build Earth reconstructions with improved accuracy and aid geoscientists in better quantifying exploration and development risk and uncertainty. In 2015, we released our next generation data processing system, Perseus, which removes our dependence on third party software and yielded turnaround improvements of over four times on our key processes. In addition to processing our own multi-client BasinSPAN 2-D programs and regionally calibrated 3-D programs, our proprietary processing and imaging business has been focused on key customers with complex 3-D imaging challenges predominantly in the marine environment for both towed streamer and seabed.

At December 31, 2016, our E&P Technology & Services segment backlog, which consists of commitments for (i) data processing work and (ii) both multi-client new venture and proprietary projects that have been underwritten, has increased to \$33.9 million compared with \$19.2 million at December 31, 2015, the majority of the increase in backlog is attributable to our 3-D imaging program. Our E&P Technology & Services segment’s fiscal-year-end backlog includes signed contracts that we can usually fulfill within approximately six months. Investments in our multi-client data library are dependent upon the timing of our new ventures projects and the availability of underwriting by our customers. Our asset light strategy enables us to scale our business to avoid significant fixed costs and to remain financially flexible as we manage the timing and levels of our capital expenditures.

E&P Advisory — Our E&P Advisors group partners with E&P operators, energy industry regulators and capital institutions to capture and monetize E&P opportunities worldwide. This group provides technical, commercial and strategic advice across the exploration and production value chain, working at basin, prospect and field scales. E&P Advisors couple ION’s proven technical capabilities with the industry’s best commercial and strategic minds to deliver fit-for-purpose solutions, employing a variety of commercial models specific to our clients’ needs.

E&P Operations Optimization Segment

Our E&P Operations Optimization segment combines our Optimization Software & Services and Devices offerings. Through this segment, we supply command and control software systems and related services for marine towed streamer and ocean bottom seismic operations. Software developed by our Optimizations Software & Services group is installed on marine towed streamer vessels and used by many ocean bottom survey crews. An advantage of our underlying software platform is that it provides common components from which to build other applications. This enables the acceleration of development and commercialization of new products as market opportunities are

identified. Marlin, our newest software solution for optimizing simultaneous operations offshore is an example of this innovation.

Products and services for our Optimizations Software & Services group include the following:

Towed Streamer Command & Control System - Our command and control software for towed streamer acquisition, Orca, integrates acquisition, planning, positioning, source and quality control systems into a seamless operation.

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Ocean Bottom Command & Control System - Gator is our integrated navigation and data management system for multi-vessel OBS, electromagnetic and transition zone operations.

Survey Planning and Optimization - We offer consulting services for planning and supervising complex surveys, including for 4-D (time lapse) and wide azimuth towed streamer survey operations. Our acquisition expertise and in-field software platforms are designed to allow clients, including both oil companies and seismic data acquisition contractors, to optimize these complex surveys, improving efficiencies, data quality and reducing costs. Our Orca and Gator systems are designed to integrate with our post-survey tools for processing, analysis and data quality control. Orca and Gator both have modules that enable in-field survey optimization. These modules are designed to enable improved, safer acquisition through analysis and prediction of sea currents and integration of the information into the acquisition plan.

Operations Management — In 2013, we introduced the first fully integrated ice management system designed to reduce risk and improve efficiency in seismic data acquisition and drilling operations in or near ice, such as in the Arctic. The United States Geological Survey estimates that the Arctic contains approximately 13% of the world's undiscovered conventional oil resources and approximately 30% of its undiscovered natural gas resources. The patented Narwhal™ system enables operators to gather, monitor and analyze data from various sources, including satellite imagery, ice charts, radar, manual observations, and wind and ocean currents, to forecast and predict ice movements in these harsh environments. With this ability to track, forecast and monitor potential ice threats, operators can make informed, proactive decisions to ensure the safety of individuals, assets and the environment, while minimizing operational downtime. More importantly, we applied this technology to develop and commercialize our Marlin solution for managing simultaneous operations during marine seismic data acquisition.

Products of our Devices group include the following:

Marine Positioning Systems — Our marine streamer positioning system includes streamer cable depth control devices, lateral control devices, compasses, acoustic positioning systems and other auxiliary sensors. This equipment is designed to control the vertical and horizontal positioning of the streamer cables and provides acoustic, compass and depth measurements to allow processors to tie navigation and location data to geophysical data to determine the location of potential hydrocarbon reserves. DigiBIRD II™ is designed to maintain streamers at pre-defined target depths more safely, efficiently, and cost effectively than ever before by eliminating workboat operations for battery changes on the majority of seismic surveys. DigiFIN® is an advanced lateral streamer control system that we commercialized in 2008. DigiFIN is designed to maintain tighter, more uniform marine streamer separation along the entire length of the streamer cable, which allows for better sampling of seismic data and improved subsurface images. We believe DigiFIN also enables faster line changes and minimizes the requirements for in-fill seismic work. In addition to manufacturing new marine positioning system devices, the Devices group also repairs its positioning equipment previously sold to its customers.

Analog Geophones — Analog geophones are land sensor devices that measure acoustic energy reflected from rock layers in the Earth's subsurface using a mechanical, coil-spring element. We manufacture and market a full suite of geophones and geophone test equipment that operate in most environments, including land surface, transition zone and downhole. Our geophones are used in other industries as well.

Ocean Bottom Services Segment

ION offers a fully-integrated OBS solution that includes expert survey design, planning and optimization, to maximize seismic image quality; safe, efficient data acquisition by the experienced team at OceanGeo; superior imaging via OceanGeo's exclusive use of our VSO systems; and data processing, interpretation and reservoir services through ION. We believe the market for ocean bottom seismic imaging is growing. OBS focuses more upon production than exploration leading E&P companies to show increased interest in ocean bottom seismic activities, consistent with their desire for higher-quality seismic imaging for complex geological formations and more detailed reservoir characteristics. Since introducing our first ocean bottom acquisition system, VSO, in 2004, we have continued to develop advanced ocean bottom systems, which we are putting to use through OceanGeo.

INOVA Geophysical Products

INOVA manufactures cable-based (G3i® and ARIES®) and cableless (Hawk®) seismic data acquisition systems, digital sensors (AccuSeis™ and VectorSeis), vibroseis vehicles (i.e., vibrator trucks, known as AHV-IV™ and UNFVIB

and source controllers for detonator and energy source (Vib Pro™ and Shot Pro™ II) business lines. We wrote our investment in INOVA down to zero as of December 31, 2014.

Product Research and Development

Our ability to compete effectively in the seismic market depends principally upon continued innovation in our underlying technologies. As such, the overall focus of our research and development efforts has remained on improving both the quality of the subsurface images we generate and the economics, efficiency and quality of the seismic data acquisition that lies at the core

of the imaging. In particular, we have concentrated on enhancing the nature and quality of the information that can be extracted from the subsurface images.

During 2016, our research and development efforts were aimed at developing key strategic technologies across all business lines with a particular focus on our Ocean Bottom Seismic services. Here, a range of new technologies have been developed, including new and flexible seismic acquisition optimization tools, as well as in-water control devices which improve the operational efficiency of marine sources. Continued development in our Optimization Software & Services group has led to a new subsurface illumination service plus significant enhancements to the capabilities of our MESA[®] survey design package. We have also invested in Marlin, a software system for managing simultaneous marine operations which provides significantly improved situational awareness across the operations area. The Marlin platform is flexible and can also be adapted and expanded beyond traditional marine seismic acquisition simultaneous operations. Within the Devices business line, we continued to develop the successful Digi family of products with the introduction of an automatic Streamer Recovery Device and also invested in the design and development of the acoustics in deployment system, aimed at improving safety and efficiency in towed streamer operations. We have also invested in the development of new seismic sensors, as well as extending the capabilities of our existing lines of sensor products. In the seismic data processing business, we continued to invest in productivity enhancements and in technologies aimed at handling increasingly complex data acquisition environments and at areas with difficult-to-image subsurface geology. In particular, we also continued research and development in maximizing the value of full-wave seismic data, particularly the extraction of new and more accurate subsurface information via significant developments in the field of Full Waveform Inversion, and novel Full Waveform imaging techniques. As many of these new services and products are under development and, as the development cycles from initial conception through to commercial introduction can extend over a number of years, their commercial feasibility or degree of commercial acceptance may not yet be established. No assurance can be given concerning the successful development of any new service or product, any enhancements to them, the specific timing of their release or their level of acceptance in the marketplace.

Markets and Customers

Our primary customers are E&P companies to whom we market and offer services, primarily imaging-related processing services from our Imaging Services group, multi-client seismic data programs from our Ventures group, and OBS data acquisition services through OceanGeo, as well as consulting services from our E&P Advisors and Optimization Software & Services group. Secondly, seismic contractors purchase our towed streamer data acquisition systems and related equipment and software to collect data in accordance with their E&P company customers' specifications or for their own seismic data libraries.

A significant part of our marketing effort is focused on areas outside of the United States. Foreign sales are subject to special risks inherent in doing business outside of the United States, including the risk of political instability, armed conflict, civil disturbances, currency fluctuations, embargo and governmental activities, customer credit risks and risk of non-compliance with U.S. and foreign laws, including tariff regulations and import/export restrictions.

We sell our services and products through a direct sales force consisting of employees and international third-party sales representatives responsible for key geographic areas. The majority of our foreign sales are denominated in U.S. dollars. During 2016, 2015 and 2014, sales to destinations outside of North America accounted for approximately 78%, 66% and 74% of our consolidated net revenues, respectively. Further, systems and equipment sold to domestic customers are frequently deployed internationally and, from time to time, certain foreign sales require export licenses. Traditionally, our business has been seasonal, with strongest demand typically in the fourth quarter of our fiscal year. For information concerning the geographic breakdown of our net revenues, see Footnote 3 "Segment and Geographic Information" of Footnotes to Consolidated Financial Statements contained elsewhere in this Annual Report on Form 10-K for additional information.

Competition

Our Imaging Services group within our E&P Technology & Services segment competes with more than a dozen companies that provide data processing services to E&P companies. See “Services and Products - E&P Technology & Services Segment.” While the barriers to enter this market are relatively low, we believe the barriers to compete at the higher end of the market - the advanced pre-stack depth migration market where our efforts are focused - are significantly higher. At the higher end of this market, CGG (an integrated geophysical company) and Schlumberger (a large integrated oilfield services company), are our E&P Technology & Services segment’s two primary competitors for advanced imaging services. Both of these companies are significantly larger than ION in terms of revenue, processing locations, sales, marketing and financial resources. In addition, both CGG and Schlumberger possess an advantage in the data processing arena, as part of more vertically integrated seismic contractor companies; for example, when these companies acquire large 3-D multi-client surveys, the internal data processing organization will usually be awarded the data processing without any requirement to compete with external vendors. CGG and Schlumberger, along with other competitors, TGS-NOPEC Geophysical Company ASA and Spectrum ASA, also develop and sell data libraries that compete with our BasinSPAN data libraries. BGP also competes in this space by primarily partnering with other competitors to develop and sell data libraries.

In the OBS market, OceanGeo competes with a number of companies, including WesternGeco, Fairfield Nodal, Seabed GeoSolutions (a joint venture of Fugro and CGG), Magseis and BGP. The OBS market primarily addresses the production end of the E&P business. This market is primarily vertically integrated with a variety of proprietary technologies, comprising both cable and nodal systems. Most companies operate one to three crews, and there have been three new entrants in the last few years.

The market for seismic services and products is highly competitive and characterized by frequent changes in technology. Our principal competitor for marine seismic equipment is Sercel (a manufacturing subsidiary of CGG). Sercel has the advantage of being able to sell its products and services to its parent company that operates both land and marine crews, providing it with a significant and stable internal market and a greater ability to test new technology in the field. The recent downturn in the industry has disrupted traditional buying patterns. We have seen a generally increasing trend of companies such as Petroleum GeoServices ASA (“PGS”) developing their own instrumentation to create a competitive advantage through products such as GeoStreamer. We also compete with other seismic equipment companies on a product-by-product basis. Our ability to compete effectively in the manufacture and sale of seismic instruments and data acquisition systems depends principally upon continued technological innovation, as well as pricing, system reliability, reputation for quality and ability to deliver on schedule.

Some seismic contractors design, engineer and manufacture seismic acquisition technology in-house (or through a network of third-party vendors) to differentiate themselves. Although this technology competes directly with our towed streamer, and ocean bottom equipment, it is not usually made available to other seismic acquisition contractors. However, the risk exists that other seismic contractors may decide to develop their own seismic technology, which would put additional pressure on the demand for our acquisition equipment.

In addition, we expect continued reductions in the market for spare parts and service of existing equipment as a result of the fleet reductions currently occurring in the marine seismic market. By 2017, we expect the number of 2-D and 3-D marine streamer vessels, including those in operation, under construction, or announced additions to capacity, to decrease by four, to approximately 89 vessels total. This 2017 projection has increased by 1 vessel from the projection one year ago. In addition, there has been an increase in recent years of consolidation within the sector, with the major vessel operators - CGG, WesternGeco and PGS - all acquiring new market entrants in the last several years. The majority of the high-end 3-D seismic capacity is concentrated among the largest three companies - CGG, WesternGeco and PGS. Those three companies are vertically integrated with technology that uniquely differentiates them from the rest of the players. This consolidation reduces the number of potential customers and vessel outfitting opportunities for us. During the downturn in the price of crude oil and the resulting reduction in capital expenditures by E&P companies, we anticipate that older, smaller and less efficient vessels will drop out of the fleet to be replaced by newer vessels.

In the land seismic equipment market, where INOVA competes, the principal competitors are Sercel and Geospace Technologies. INOVA is a joint venture with BGP as a majority stake owner. BGP purchases land seismic equipment

from both INOVA and its competitors.

Intellectual Property

We rely on a combination of patents, copyrights, trademark, trade secrets, confidentiality procedures and contractual provisions to protect our proprietary technologies. We have approximately 500 patents and pending patent applications, including filings in international jurisdictions with respect to the same kinds of technologies. Although our portfolio of patents is considered important to our operations, and particular patents may be material to specific business lines, no one patent is considered essential to our consolidated business operations.

Our patents, copyrights and trademarks offer us only limited protection. Our competitors may attempt to copy aspects of our products despite our efforts to protect our proprietary rights, or may design around the proprietary features of our products. Policing unauthorized use of our proprietary rights is difficult, and we may be unable to determine the extent to which such use occurs. Our difficulties are compounded in certain foreign countries where the laws do not offer as much protection for proprietary rights as the laws of the United States. From time to time, third parties inquire and claim that we have infringed upon their intellectual property rights and we make similar inquiries and claims to third parties. Material intellectual property litigation is discussed in detail in Item 3. “Legal Proceedings.”

The information contained in this Annual Report on Form 10-K contains references to trademarks, service marks and registered marks of ION and our subsidiaries, as indicated. Except where stated otherwise or unless the context otherwise requires, the terms “VectorSeis,” “ARIES II,” “DigiFIN,” “DigiCOURSE,” “Hawk,” “Orca,” “Reflex,” “G3i,” “Calypso,” “WiBand,” “UNIVIB” and “MESA” refer to the VECTORSEIS® II, DIGIFIN®, DIGICOURSE®, ORCA®, WiBand®, UNIVIB® and MESA® registered marks owned by ION or INOVA Geophysical, and the terms “BasinSPAN,” “DigiSTREAMER,” “Gator,” “AHV-IV,” “Vib Pro,” “Shot Pro,” “Optimiser,” “ResSCAN,” “Narwhal,” “AccuSeis,” “PRECISION,” “REFLEX,” “Calypso” and “Marlin” refer to the BasinSPAN™, DigiSTREAMER™, GATOR™, AHV-IV™, Vib Pro™, Shot Pro™, Optimiser™, ResSCAN™, Narwhal™, AccuSeis™, Precision™, REFLEX™, Calypso™, and Marlin™ trademarks and service marks owned by ION or INOVA Geophysical.

Regulatory Matters

Our operations are subject to various international conventions, laws and regulations in the countries in which we operate, including laws and regulations relating to the importation of and operation of seismic equipment, currency conversions and repatriation, oil and gas exploration and development, taxation of offshore earnings and earnings of expatriate personnel, environmental protection, the use of local employees and suppliers by foreign contractors and duties on the importation and exportation of equipment. Our operations are subject to government policies and product certification requirements worldwide. Governments in some foreign countries have become increasingly active in regulating the companies holding concessions, the exploration for oil and gas and other aspects of the oil and gas industries in their countries. In some areas of the world, this governmental activity has adversely affected the amount of exploration and development work done by major oil and gas companies and may continue to do so. Operations in less developed countries can be subject to legal systems that are not as mature or predictable as those in more developed countries, which can lead to greater uncertainty in legal matters and proceedings.

Changes in these conventions, regulations, policies or requirements could affect the demand for our services and products or result in the need to modify them, which may involve substantial costs or delays in sales and could have an adverse effect on our future operating results. Our export activities are subject to extensive and evolving trade regulations. Certain countries are subject to trade restrictions, embargoes and sanctions imposed by the U.S. government. These restrictions and sanctions prohibit or limit us from participating in certain business activities in those countries.

Our operations are also subject to numerous local, state and federal laws and regulations in the United States and in foreign jurisdictions concerning the containment and disposal of hazardous materials, the remediation of contaminated properties and the protection of the environment. While the industry has experienced an increase in general environmental regulation worldwide and laws and regulations protecting the environment have generally become more stringent, we do not believe compliance with these regulations has resulted in a material adverse effect on our business or results of operations, and we do not currently foresee the need for significant expenditures in order to be able to remain compliant in all material respects with current environmental protection laws. Regulations in this area are subject to change, and there can be no assurance that future laws or regulations will not have a material adverse effect on us.

Our customers’ operations are also significantly impacted in other respects by laws and regulations concerning the protection of the environment and endangered species. For instance, many of our marine contractors have been affected by regulations protecting marine mammals in the Gulf of Mexico. To the extent that our customers’ operations are disrupted by future laws and regulations, our business and results of operations may be materially adversely affected.

Employees

As of December 31, 2016, we had 480 regular, full-time employees, 335 of whom were located in the U.S. From time to time and on an as-needed basis, we supplement our regular workforce with individuals that we hire temporarily or retain as independent contractors in order to meet certain internal manufacturing or other business needs. Our U.S. employees are not represented by any collective bargaining agreement, and we have never experienced a labor-related work stoppage. We believe that our employee relations are satisfactory.

Financial Information by Segment and Geographic Area

For a discussion of financial information by business segment and geographic area, see Footnote 3 “Segment and Geographic Information” of Footnotes to Consolidated Financial Statements.

Available Information

Our executive headquarters are located at 2105 CityWest Boulevard, Suite 100, Houston, Texas 77042-2839. Our international sales headquarters are located at LOB 16, office 511, Jebel Ali Free Zone, P.O. Box 18627, Dubai, United Arab Emirates. Our telephone number is (281) 933-3339. Our home page on the internet is www.iongeo.com. We make our website content available for information purposes only. Unless specifically incorporated by reference in this Annual Report on Form 10-K, information that you may find on our website is not part of this report.

In portions of this Annual Report on Form 10-K, we incorporate by reference information from parts of other documents filed with the Securities and Exchange Commission (“SEC”). The SEC allows us to disclose important information by referring to it in this manner, and you should review this information. We make our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, annual reports to stockholders, and proxy statements for our stockholders’ meetings, as well as any amendments, available free of charge through our website as soon as reasonably practicable after we electronically file those materials with, or furnish them to, the SEC.

You can learn more about us by reviewing our SEC filings on our website. Our SEC reports can be accessed through the Investor Relations section on our website. The SEC also maintains a website at www.sec.gov that contains reports, proxy statements, and other information regarding SEC registrants, including our company.

Item 1A. Risk Factors

This report contains or incorporates by reference statements concerning our future results and performance and other matters that are “forward-looking” statements within the meaning of Section 27A of the Securities Act of 1933, as amended (“Securities Act”), and Section 21E of the Securities Exchange Act of 1934, as amended (“Exchange Act”). These statements involve known and unknown risks, uncertainties and other factors that may cause our or our industry’s results, levels of activity, performance, or achievements to be materially different from any future results, levels of activity, performance, or achievements expressed or implied by such forward-looking statements. In some cases, you can identify forward-looking statements by terminology such as “may,” “will,” “would,” “should,” “intend,” “expect,” “plan,” “anticipate,” “believe,” “estimate,” “predict,” “potential,” or “continue” or the negative of such terms or other comparative terminology. Examples of other forward-looking statements contained or incorporated by reference in this report include statements regarding:

- any additional damages or adverse rulings in the WesternGeco litigation and future potential adverse effects on our liquidity in the event that we must collateralize our appeal bond for the full amount of the bond;
- future levels of capital expenditures of our customers for seismic activities;
- future oil and gas commodity prices;
- the effects of current and future worldwide economic conditions (particularly in developing countries) and demand for oil and natural gas and seismic equipment and services;
- future cash needs and availability of cash to fund our operations and pay our obligations;
- the effects of current and future unrest in the Middle East, North Africa and other regions;
- the timing of anticipated revenues and the recognition of those revenues for financial accounting purposes;
- the effects of ongoing and future industry consolidation, including, in particular, the effects of consolidation and vertical integration in the towed marine seismic streamers market;
- the timing of future revenue realization of anticipated orders for multi-client survey projects and data processing work in our E&P Technology & Services segment;
- future levels of our capital expenditures;
- future government regulations, pertaining to the oil and gas industry;
- expected net revenues, income from operations and net income;
- expected gross margins for our services and products;
- future benefits to be derived from our OceanGeo subsidiary;
- future seismic industry fundamentals, including future demand for seismic services and equipment;
- future benefits to our customers to be derived from new services and products;

- future benefits to be derived from our investments in technologies, joint ventures and acquired companies;
- future growth rates for our services and products;
- the degree and rate of future market acceptance of our new services and products;
- expectations regarding E&P companies and seismic contractor end-users purchasing our more technologically-advanced services and products;
- anticipated timing and success of commercialization and capabilities of services and products under development and start-up costs associated with their development;
- future opportunities for new products and projected research and development expenses;
- expected continued compliance with our debt financial covenants;
- expectations regarding realization of deferred tax assets;
- anticipated results with respect to certain estimates we make for financial accounting purposes; and
- compliance with the U.S. Foreign Corrupt Practices Act and other applicable U.S. and foreign laws prohibiting corrupt payments to government officials and other third parties.

These forward-looking statements reflect our best judgment about future events and trends based on the information currently available to us. Our results of operations can be affected by inaccurate assumptions we make or by risks and uncertainties known or unknown to us. Therefore, we cannot guarantee the accuracy of the forward-looking statements. Actual events and results of operations may vary materially from our current expectations and assumptions. While we cannot identify all of the factors that may cause actual results to vary from our expectations, we believe the following factors should be considered carefully:

An unfavorable outcome in our pending litigation matter with WesternGeco could have a materially adverse effect on our financial results and liquidity.

In June 2009, WesternGeco filed a lawsuit against us in the United States District Court for the Southern District of Texas, Houston Division. In the lawsuit, styled WesternGeco L.L.C. v. ION Geophysical Corporation, WesternGeco alleged that we had infringed several method and apparatus claims contained in four of its United States patents regarding marine seismic streamer steering devices.

The trial began in July 2012. A verdict was returned by the jury in August 2012, finding that we infringed the claims contained in the four patents by supplying our DigiFIN lateral streamer control units and the related software from the United States and awarded WesternGeco the sum of \$105.9 million in damages, consisting of \$12.5 million in reasonable royalty and \$93.4 million in lost profits.

In June 2013, the presiding judge entered a Memorandum and Order, denying our post-verdict motions that challenged the jury's infringement findings and the damages amount. In the Memorandum and Order, the judge also stated that WesternGeco is entitled to be awarded supplemental damages for the additional DigiFIN units that were supplied from the United States before and after trial that were not included in the jury verdict due to the timing of the trial. In October 2013, the judge entered another Memorandum and Order, ruling on the number of DigiFIN units that are subject to supplemental damages and also ruling that the supplemental damages applicable to the additional units should be calculated by adding together the jury's previous reasonable royalty and lost profits damages awards per unit, resulting in supplemental damages of \$73.1 million.

In April 2014, the judge entered another Order, ruling that lost profits should not have been included in the calculation of supplemental damages in the October 2013 Memorandum and Order and reducing the supplemental damages award in the case from \$73.1 million to \$9.4 million. In the Order, the judge also further reduced the damages award in the case by \$3.0 million to reflect a settlement and license that WesternGeco entered into with a customer of ours that had purchased and used DigiFIN units that were also included in the damage amounts awarded against us.

In May 2014, the judge signed and entered a Final Judgment against us in the amount of \$123.8 million. The Final Judgment also included an injunction that enjoins us, our agents and anyone acting in concert with us, from supplying in or from the United States the DigiFIN product or any parts unique to the DigiFIN product, or any instrumentality no more than colorably different from any of these products or parts, for combination outside of the United States. We have conducted our business in compliance with the district court's orders in the case, and we have reorganized our operations such that we no longer supply the DigiFIN product or any parts unique to the DigiFIN product in or from the United States.

We and WesternGeco each appealed the Final Judgment to the United States Court of Appeals for the Federal Circuit in Washington, D.C. On July 2, 2015, the Court of Appeals reversed in part the Final Judgment, holding the district court erred by including lost profits in the Final Judgment. Lost profits were \$93.4 million and prejudgment interest on the lost profits was approximately \$10.9 million of the \$123.8 million Final Judgment. Pre-judgment interest on the lost profits portion will be

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treated in the same way as the lost profits. Post-judgment interest will likewise be treated in the same fashion. On July 29, 2015, WesternGeco filed a petition for rehearing en banc before the Court of Appeals. On October 30, 2015 the Court of Appeals denied WesternGeco's petition for rehearing en banc.

As previously disclosed, we had previously taken a loss contingency accrual of \$123.8 million. As a result of the reversal by the Court of Appeals, as of June 30, 2015, we reduced our loss contingency accrual to \$22.0 million. In February 26, 2016, WesternGeco filed a petition for writ of certiorari by the Supreme Court. We filed our response on April 27, 2016. Subsequently, on June 20, 2016, the Supreme Court refused to disturb the Court of Appeals ruling finding no lost profits as a matter of law. Separately, in light of the changes in case law regarding the standard of proof for willfulness in the Halo and Stryker cases, the Supreme Court indicated that the case should be remanded to the Federal Circuit for a determination of whether or not the willfulness determination by the District Court was appropriate.

On October 14, 2016, the United States Court of Appeals for the Federal Circuit issued a mandate returning the case to the District Court for consideration of whether or not additional damages for willfulness are appropriate. We will argue enhancement is not proper here under the new law, just as it was not under prior law, but in any event should be based on the royalty award, not the award plus interest.

On November 14, 2016, the District Court issued an order reducing the amount of the appeal bond from \$120.0 million to \$65.0 million dollars, ordered the sureties to pay principal and interest on the royalty previously awarded and declined to issue a final judgment until after consideration of whether enhanced damages related to willfulness should be awarded in the case. While we do not agree with the unusual decision by the District Court ordering payment of the royalty damages and interest without a final judgment, we paid the \$20.8 million due pursuant to the order to WesternGeco on November 25, 2016. After this payment the remaining \$1.1 million accrual was reversed to zero. The district court previously refused WesternGeco's request for additional damages for willfulness, but a change in the law in June 2016, permitted WesternGeco to renew its request, we have opposed WesternGeco's motion.

WesternGeco has also filed a motion in the U.S. Supreme Court indicating it intends to appeal the lost profits again. We will oppose WesternGeco's second attempt to appeal to the Supreme Court matters it did not succeed on in its appeal last year (among other reasons). After issuance of a final judgment, we will decide whether or not to pursue available appeals regarding the decision. For additional discussion about our liquidity related to posting an appeal bond, see Item 7. "Management's Discussion and Analysis of Financial Condition and Results of Operations — Meeting our Liquidity Requirements — Loss Contingency – WesternGeco Lawsuit" in Part II of this Form 10-K.

We may not ultimately prevail in the appeals process and we could be required to pay any additional amount ordered by the court up to approximately \$44.0 million. Our assessment that we do not have a loss contingency may change in the future due to developments at the appellate court and other events, such as changes in applicable law, and such reassessment could lead to the determination that a loss contingency is probable, which could have a material effect on our business, financial condition and results of operations. Our assessments disclosed in this Annual Report on Form 10-K or elsewhere are based on currently available information and involve elements of judgment and significant uncertainties. Actual losses may exceed or be considerably less than payments we made in 2016.

Our business depends on the level of exploration and production activities by the oil and natural gas industry. If crude oil and natural gas prices or the level of capital expenditures by E&P companies decline, demand for our services and products would decline and our results of operations would be materially adversely affected.

Demand for our services and products depends upon the level of spending by E&P companies and seismic contractors for exploration and production activities, and those activities depend in large part on oil and gas prices. Spending by our customers on services and products that we provide is highly discretionary in nature, and subject to rapid and material change. Any decline in oil and gas related spending on behalf of our customers could cause alterations in our capital spending plans, project modifications, delays or cancellations, general business disruptions or delays in payment, or non-payment of amounts that are owed to us, any one of which could have a material adverse effect on our financial condition and results of operations and on our ability to continue to satisfy all of the covenants in our debt agreements. Additionally, the recent increases in oil and gas prices may not increase demand for our services and products or otherwise have a positive effect on our financial condition or results of operations. E&P companies' willingness to explore, develop and produce depends largely upon prevailing industry conditions that are influenced

by numerous factors over which our management has no control, such as:

- the supply of and demand for oil and gas;
- the level of prices, and expectations about future prices, of oil and gas;
- the cost of exploring for, developing, producing and delivering oil and gas;
- the expected rates of decline for current production;
- the discovery rates of new oil and gas reserves;

- weather conditions, including hurricanes, that can affect oil and gas operations over a wide area, as well as less severe inclement weather that can preclude or delay seismic data acquisition;
- domestic and worldwide economic conditions;
- significant devaluation of the Mexican Peso and its impact on the Mexican economy and offshore exploration programs;
- political instability in oil and gas producing countries;
- technical advances affecting energy consumption;
- government policies regarding the exploration, production and development of oil and gas reserves;
- the ability of oil and gas producers to raise equity capital and debt financing;
- merger and divestiture activity among oil and gas companies and seismic contractors; and
- compliance by members of the Organization of the Petroleum Exporting Countries (“OPEC”) and non-OPEC members such as Russia, with recent agreements to cut oil production.

The level of oil and gas exploration and production activity has been volatile in recent years. Trends in oil and gas exploration and development activities have declined, together with demand for our services and products. Any prolonged substantial reduction in oil and gas prices would likely further affect oil and gas production levels and therefore adversely affect demand for the services we provide and products we sell.

Our operating results often fluctuate from period to period, and we are subject to cyclicity and seasonality factors. Our industry and the oil and gas industry in general are subject to cyclical fluctuations. Demand for our services and products depends upon spending levels by E&P companies for exploration, production, development and field management of oil and natural gas reserves and, in the case of new seismic data creation, the willingness of those companies to forgo ownership in the seismic data. Capital expenditures by E&P companies for these activities depend upon several factors, including actual and forecasted prices of oil and natural gas and those companies’ short-term and strategic plans.

After a period of exploration-focused activities by E&P companies leading up to the fourth quarter of 2014, many E&P companies turned their focus more to production activities and less on exploration of prospects during 2015 and 2016, as the continued decline in oil and gas prices resulted in decreasing revenues and prompted cost reduction initiatives across the industry. During the fourth quarter 2016, the World Bank raised its 2017 forecast for crude oil prices to \$55 per barrel from \$53 per barrel as members of OPEC prepare to limit production after a long period of unrestrained output. Energy prices, which include oil, natural gas and coal, are projected to increase overall next year projecting a modest recovery for most commodities in 2017 as demand strengthens and supplies tighten. As of December 31, 2016, our E&P Technology & Services segment backlog, consisting of commitments for data processing work and for underwritten multi-client new venture and proprietary projects increased by 77% compared to our existing backlog as of December 31, 2015. The increase in our backlog was primarily due to the Campeche project offshore Mexico. We expect the most recent contract extension from PEMEX to contribute toward rebuilding our backlog as additional work orders under this contract extension are received.

Our operating results are subject to fluctuations from period to period as a result of introducing new services and products, the timing of significant expenses in connection with customer orders, unrealized sales, levels of research and development activities in different periods, the product and service mix of our revenues and the seasonality of our business. Because some of our products feature a high sales price and are technologically complex, we generally experience long sales cycles for these types of products and historically incur significant expense at the beginning of these cycles. In addition, the revenues can vary widely from period to period due to changes in customer requirements and demand. These factors can create fluctuations in our net revenues and results of operations from period to period. Variability in our overall gross margins for any period, which depend on the percentages of higher-margin and lower-margin services and products sold in that period, compounds these uncertainties. As a result, if net revenues or gross margins fall below expectations, our results of operations and financial condition will likely be materially adversely affected.

Additionally, our business can be seasonal in nature, with strongest demand typically in the fourth calendar quarter of each year. Customer budgeting cycles at times result in higher spending activity levels by our customers at different points of the year.

Due to the relatively high sales price of many of our products and seismic data libraries, our quarterly operating results have historically fluctuated from period to period due to the timing of orders and shipments and the mix of services and products sold. This uneven pattern makes financial predictions for any given period difficult, increases the risk of unanticipated variations in our quarterly results and financial condition, and places challenges on our inventory management. Delays caused by factors beyond our control can affect our E&P Technology & Services segment's revenues from its imaging and multi-client services from period to period. Also, delays in ordering products or in shipping or delivering products in a given period could significantly affect our results of operations for that period. While we experienced an all-time record for data library sales in the fourth quarter of 2013, sales starting in 2014 and continuing through 2016 have been negatively impacted by a softening of exploration spending by our E&P customers. Fluctuations in our quarterly operating results may cause greater volatility in the market price of our common stock.

Our indebtedness could adversely affect our liquidity, financial condition and our ability to fulfill our obligations and operate our business.

As of December 31, 2016, we had approximately \$158.8 million of total outstanding indebtedness, including \$3.4 million of capital leases. As of December 31, 2016, there was \$10.0 million outstanding indebtedness under our Credit Facility. Under our Credit Facility, as amended, the lender has committed \$40.0 million of revolving credit, subject to a borrowing base. As of December 31, 2016, we have \$15.2 million remaining availability under the Credit Facility. The amount available will increase or decrease monthly as our borrowing base changes. We may also incur additional indebtedness in the future. If we are required to post collateral for an appeal bond with a surety during the appeal process, depending on the size of the bond and the level of required collateral, in order to collateralize the bond, we might need to utilize a combination of cash on hand and undrawn sums available for borrowing under our Credit Facility, and possibly incur additional debt financing. See "Management's Discussion and Analysis of Financial Condition and Results of Operations" appearing below in this Form 10-K.

In October 2016, S&P Global Ratings ("S&P") raised our corporate credit rating to CCC+ from SD and maintains a negative outlook. In May 2016, Moody's Investors Service ("Moody's") affirmed a Corporate Family Rating of Caa2 and its rating outlook was changed from negative to stable. These rating actions followed our completed exchange offer. S&P continues to hold a negative outlook on our Company reflecting the high debt leverage, expected negative free cash flow and the potential for liquidity to weaken, if market conditions do not significantly improve.

Our high level of indebtedness could have negative consequences to us, including:

- we may have difficulty satisfying our obligations with respect to our outstanding debt;
- we may have difficulty obtaining financing in the future for working capital, capital expenditures, acquisitions or other purposes;
- we may need to use all, or a substantial portion, of our available cash flow to pay interest and principal on our debt, which will reduce the amount of money available to finance our operations and other business activities;
- our vulnerability to general economic downturns and adverse industry conditions could increase;
- our flexibility in planning for, or reacting to, changes in our business and in our industry in general could be limited;
- our amount of debt and the amount we must pay to service our debt obligations could place us at a competitive disadvantage compared to our competitors that have less debt;
- our customers may react adversely to our significant debt level and seek or develop alternative licensors or suppliers;
- we may have insufficient funds, and our debt level may also restrict us from raising the funds necessary to repurchase all of the Notes, as defined below, tendered to us upon the occurrence of a change of control, which would constitute an event of default under the Notes; and
- our failure to comply with the restrictive covenants in our debt instruments which, among other things, limit our ability to incur debt and sell assets, could result in an event of default that, if not cured or waived, could have a material adverse effect on our business or prospects.

Our level of indebtedness will require that we use a substantial portion of our cash flow from operations to pay principal of, and interest on, our indebtedness, which will reduce the availability of cash to fund working capital requirements, capital expenditures, research and development and other general corporate or business activities.

We are subject to intense competition, which could limit our ability to maintain or increase our market share or to maintain our prices at profitable levels.

Many of our sales are obtained through a competitive bidding process, which is standard for our industry. Competitive factors in recent years have included price, technological expertise, and a reputation for quality, safety and dependability. While no single company competes with us in all of our segments, we are subject to intense competition in each of our segments. New entrants in many of the markets in which certain of our services and products are currently strong should be expected. See Item 1. "Business – Competition." We compete with companies that are larger than we are in terms of revenues, technical personnel, number of processing locations and sales and marketing resources. A few of our competitors have a competitive advantage in being part of a large affiliated seismic contractor company. In addition, we compete with major service providers and government-sponsored enterprises and affiliates. Some of our competitors conduct seismic data acquisition operations as part of their regular business, which we have traditionally not conducted, and have greater financial and other resources than we do. These and other competitors may be better positioned to withstand and adjust more quickly to volatile market conditions, such as fluctuations in oil and natural gas prices, as well as changes in government regulations. In addition, any excess supply of services and products in the seismic services market could apply downward pressure on prices for our services and products. The negative effects of the competitive environment in which we operate could have a material adverse effect on our results of operations. In particular, the consolidation in recent years of many of our competitors in the seismic services and products markets has negatively impacted our results of operations.

There are a number of geophysical companies that create, market and license seismic data and maintain seismic libraries. Competition for acquisition of new seismic data among geophysical service providers historically has been intense and we expect this competition will continue to be intense. Larger and better-financed operators could enjoy an advantage over us in a competitive environment for new data.

Our OceanGeo subsidiary involves numerous risks.

Our OceanGeo subsidiary is focused on operating as a seismic acquisition contractor concentrating on OBS data acquisition. There can be no assurance that we will achieve the expected benefits from this company. OceanGeo (and any future acquisitions that we may undertake) may result in unexpected costs, expenses and liabilities, which may have a material adverse effect on our business, financial condition or results of operations. OceanGeo may encounter further difficulties in developing and expanding its business.

OceanGeo's business exposes us to the operating risks of being a seismic contractor with seismic crews:

Seismic data acquisition activities in marine ocean bottom areas are subject to the risk of downtime or reduced productivity, as well as to the risks of loss to property and injury to personnel, mechanical failures and natural disasters. In addition to losses caused by human errors and accidents, we may also become subject to losses resulting from, among other things, political instability, business interruption, strikes and weather events; and

OceanGeo's equipment and services may expose us to litigation and legal proceedings, including those related to product liability, personal injury and contract liability.

We have in place insurance coverage against operating hazards, including product liability claims and personal injury claims, damage, destruction or business interruption related to OceanGeo's equipment and services, and whenever possible, OceanGeo will obtain agreements from customers that limit our liability. We also carry war, strikes, terrorism and related perils coverage for OceanGeo. However, we cannot provide assurance that the nature and amount of insurance will be sufficient to fully indemnify OceanGeo and us against liabilities arising from pending and future claims or that its insurance coverage will be adequate in all circumstances or against all hazards, and that we will be able to maintain adequate insurance coverage in the future at commercially reasonable rates or on acceptable terms.

OceanGeo is also subject to, and exposes OceanGeo and us to, various additional risks that could adversely affect our results of operations and financial condition. These risks include the following:

- increased costs associated with the operation of the business and the management of geographically dispersed operations;

- OceanGeo's cash flows may be inadequate to fund its capital requirements, thereby requiring additional contributions to OceanGeo by us;

OceanGeo's cash flows may be inadequate to realize the value of equipment manufactured by our Devices group and transferred to OceanGeo for use in its ocean bottom seismic surveys;
risks associated with our Calypso ocean bottom product that is intended to be utilized by OceanGeo in its operations, including risks that the new technology may not perform as well as we anticipate;

- difficulties in retaining and integrating key technical, sales and marketing personnel and the possible loss of such employees and costs associated with their loss;
- the diversion of management's attention and other resources from other business operations and related concerns;
- the requirement to maintain uniform standards, controls and procedures;
- our inability to realize operating efficiencies, cost savings or other benefits that we expect from OceanGeo's operations; and
- difficulties and delays in securing new business and customer projects.

The indentures governing the 9.125% Senior Secured Second-Priority Notes due 2021 and 8.125% Senior Secured Third-Priority Notes due 2018 (the "Notes") contain a number of restrictive covenants that limit our ability to finance future operations or capital needs or engage in other business activities that may be in our interest.

The indenture governing the Notes imposes, and the terms of any future indebtedness may impose, operating and other restrictions on us and our subsidiaries. Such restrictions affect, or will affect, and in many respects limit or prohibit, among other things, our ability and the ability of certain of our subsidiaries to:

- incur additional indebtedness;
- create liens;
- pay dividends and make other distributions in respect of our capital stock;
 - redeem our capital stock;
- make investments or certain other restricted payments;
- sell certain kinds of assets;
- enter into transactions with affiliates; and
- effect mergers or consolidations.

The restrictions contained in the indenture governing the Notes could:

- limit our ability to plan for or react to market or economic conditions or meet capital needs or otherwise restrict our activities or business plans; and
- adversely affect our ability to finance our operations, acquisitions, investments or strategic alliances or other capital needs or to engage in other business activities that would be in our interest.

A breach of any of these covenants could result in a default under the indenture governing the Notes. If an event of default occurs, the trustee and holders of the Notes could elect to declare all borrowings outstanding, together with accrued and unpaid interest, to be immediately due and payable. An event of default under the indenture governing the Notes would also constitute an event of default under our Credit Facility. See Footnote 4 "Long-term Debt and Lease Obligations" of the Footnotes to Consolidated Financial Statements appearing below in this Form 10-K.

As a technology-focused company, we are continually exposed to risks related to complex, highly technical services and products.

We have made, and we will continue to make, strategic decisions from time to time as to the technologies in which we invest. If we choose the wrong technology, our financial results could be adversely impacted. Our operating results are dependent upon our ability to improve and refine our seismic imaging and data processing services and to successfully develop, manufacture and market our products and other services and products. New technologies generally require a substantial investment before any assurance is available as to their commercial viability. If we choose the wrong technology, or if our competitors develop or select a superior technology, we could lose our existing customers and be unable to attract new customers, which would harm our business and operations.

New data acquisition or processing technologies may be developed. New and enhanced services and products introduced by one of our competitors may gain market acceptance and, if not available to us, may adversely affect us. The markets for our services and products are characterized by changing technology and new product introductions. We must invest substantial capital to develop and maintain a leading edge in technology, with no assurance that we will receive an adequate rate of return on those investments. If we are unable to develop and produce successfully and timely new or enhanced services and products, we will be unable to compete in the future and our business, our results of operations and our financial condition will be materially and adversely affected. Our business could suffer from unexpected developments in technology, or from our failure to adapt to these changes. In addition, the preferences and

requirements of customers can change rapidly.

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The businesses of our E&P Technology & Services segment and Optimization Software & Services group within our E&P Operations Optimization segment, being more concentrated in software, processing services and proprietary technologies, have also exposed us to various risks that these technologies typically encounter, including the following:

- future competition from more established companies entering the market;
- technology obsolescence;
- dependence upon continued growth of the market for seismic data processing;
- the rate of change in the markets for these segments' technology and services;
- further consolidation of the participants within this market;
- research and development efforts not proving sufficient to keep up with changing market demands;
- dependence on third-party software for inclusion in these segments' services and products;
- misappropriation of these segments' technology by other companies;
- alleged or actual infringement of intellectual property rights that could result in substantial additional costs;
- difficulties inherent in forecasting sales for newly developed technologies or advancements in technologies;
- recruiting, training and retaining technically skilled, experienced personnel that could increase the costs for these segments, or limit their growth; and
- the ability to maintain traditional margins for certain of their technology or services.

Seismic data acquisition and data processing technologies historically have progressed rather rapidly and we expect this progression to continue. In order to remain competitive, we must continue to invest additional capital to maintain, upgrade and expand our seismic data acquisition and processing capabilities. However, due to potential advances in technology and the related costs associated with such technological advances, we may not be able to fulfill this strategy, thus possibly affecting our ability to compete.

Our customers often require demanding specifications for performance and reliability of our services and products. Because many of our products are complex and often use unique advanced components, processes, technologies and techniques, undetected errors and design and manufacturing flaws may occur. Even though we attempt to assure that our systems are always reliable in the field, the many technical variables related to their operations can cause a combination of factors that can, and have from time to time, caused performance and service issues with certain of our products. Product defects result in higher product service, warranty and replacement costs and may affect our customer relationships and industry reputation, all of which may adversely impact our results of operations. Despite our testing and quality assurance programs, undetected errors may not be discovered until the product is purchased and used by a customer in a variety of field conditions. If our customers deploy our new products and they do not work correctly, our relationship with our customers may be materially and adversely affected.

As a result of our systems' advanced and complex nature, we expect to experience occasional operational issues from time to time. Generally, until our products have been tested in the field under a wide variety of operational conditions, we cannot be certain that performance and service problems will not arise. In that case, market acceptance of our new products could be delayed and our results of operations and financial condition could be adversely affected.

We have invested, and expect to continue to invest, significant sums of money in acquiring and processing seismic data for our E&P Technology & Services' multi-client data library, without knowing precisely how much of this seismic data we will be able to license or when and at what price we will be able to license the data sets. Our business could be adversely affected by the failure of our customers to fulfill their obligations to reimburse us for the underwritten portion of our seismic data acquisition costs for our multi-client library.

We invest significant amounts in acquiring and processing new seismic data to add to our E&P Technology & Services' multi-client data library. The costs of most of these investments are funded by our customers, with the remainder generally being recovered through future data licensing fees. In 2016, we invested approximately \$14.9 million in our multi-client data library. Our customers generally commit to licensing the data prior to our initiating a new data library acquisition program. However, the aggregate amounts of future licensing fees for this data are uncertain and depend on a variety of factors, including the market prices of oil and gas, customer demand for seismic data in the library, and the availability of similar data from competitors.

By making these investments in acquiring and processing new seismic data for our E&P Technology & Services' multi-client library, we are exposed to the following risks:

We may not fully recover our costs of acquiring and processing seismic data through future sales. The ultimate amounts involved in these data sales are uncertain and depend on a variety of factors, many of which are beyond our control.

The timing of these sales is unpredictable and can vary greatly from period to period. The costs of each survey are capitalized and then amortized as a percentage of sales and/or on a straight-line basis over the expected useful life of the data. This amortization will affect our earnings and, when combined with the sporadic nature of sales, will result in increased earnings volatility.

Regulatory changes that affect companies' ability to drill, either generally or in a specific location where we have acquired seismic data, could materially adversely affect the value of the seismic data contained in our library.

Technology changes could also make existing data sets obsolete. Additionally, each of our individual surveys has a limited book life based on its location and oil and gas companies' interest in prospecting for reserves in such location, so a particular survey may be subject to a significant decline in value beyond our initial estimates.

The value of our multi-client data could be significantly adversely affected if any material adverse change occurs in the general prospects for oil and gas exploration, development and production activities.

The cost estimates upon which we base our pre-commitments of funding could be wrong. The result could be losses that have a material adverse effect on our financial condition and results of operations. These pre-commitments of funding are subject to the creditworthiness of our clients. In the event that a client refuses or is unable to pay its commitment, we could incur a substantial loss on that project.

As part of our asset-light strategy, we routinely charter vessels from third-party vendors to acquire seismic data for our multi-client business. As a result, our cost to acquire our multi-client data could significantly increase if vessel charter prices rise materially.

Reductions in demand for our seismic data, or lower revenues of or cash flows from our seismic data, may result in a requirement to increase amortization rates or record impairment charges in order to reduce the carrying value of our data library. These increases or charges, if required, could be material to our operating results for the periods in which they are recorded.

A substantial portion (approximately 93% in 2016) of our seismic acquisition project costs (including third-party project costs) are underwritten by our customers. In the event that underwriters for such projects fail to fulfill their obligations with respect to such underwriting commitments, we would continue to be obligated to satisfy our payment obligations to third-party contractors.

We derive a substantial amount of our revenues from foreign operations and sales, which pose additional risks.

The majority of our foreign sales are denominated in U.S. dollars. Sales to customer destinations outside of North America represented 78%, 66% and 74% of our consolidated net revenues for 2016, 2015 and 2014, respectively, of our consolidated net revenues. We believe that export sales will remain a significant percentage of our revenue. U.S. export restrictions affect the types and specifications of products we can export. Additionally, in order to complete certain sales, U.S. laws may require us to obtain export licenses, and we cannot assure you that we will not experience difficulty in obtaining these licenses.

Like many energy services companies, we have operations in and sales into certain international areas, including parts of the Middle East, West Africa, Latin America, Asia Pacific and the former Soviet Union, that are subject to risks of war, political disruption, civil disturbance, political corruption, possible economic and legal sanctions (such as possible restrictions against countries that the U.S. government may in the future consider to be state sponsors of terrorism) and changes in global trade policies. Our sales or operations may become restricted or prohibited in any country in which the foregoing risks occur. In particular, the occurrence of any of these risks could result in the following events, which in turn, could materially and adversely impact our results of operations:

- disruption of E&P activities;
- restriction on the movement and exchange of funds;
- inhibition of our ability to collect advances and receivables;
- enactment of additional or stricter U.S. government or international sanctions;

• limitation of our access to markets for periods of time;
• expropriation and nationalization of assets of our company or those of our customers;

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political and economic instability, which may include armed conflict and civil disturbance; currency fluctuations, devaluations and conversion restrictions; confiscatory taxation or other adverse tax policies; and governmental actions that may result in the deprivation of our contractual rights.

Our international operations and sales increase our exposure to other countries' restrictive tariff regulations, other import/export restrictions and customer credit risk.

In addition, we are subject to taxation in many jurisdictions and the final determination of our tax liabilities involves the interpretation of the statutes and requirements of taxing authorities worldwide. Our tax returns are subject to routine examination by taxing authorities, and these examinations may result in assessments of additional taxes, penalties and/or interest.

We may be unable to obtain broad intellectual property protection for our current and future products and we may become involved in intellectual property disputes; we rely on developing and acquiring proprietary data which we keep confidential.

We rely on a combination of patent, copyright and trademark laws, trade secrets, confidentiality procedures and contractual provisions to protect our proprietary technologies. We believe that the technological and creative skill of our employees, new product developments, frequent product enhancements, name recognition and reliable product maintenance are the foundations of our competitive advantage. Although we have a considerable portfolio of patents, copyrights and trademarks, these property rights offer us only limited protection. Our competitors may attempt to copy aspects of our products despite our efforts to protect our proprietary rights, or may design around the proprietary features of our products. Policing unauthorized use of our proprietary rights is difficult, and we are unable to determine the extent to which such use occurs. Our difficulties are compounded in certain foreign countries where the laws do not offer as much protection for proprietary rights as the laws of the United States.

Third parties inquire and claim from time to time that we have infringed upon their intellectual property rights. Many of our competitors own their own extensive global portfolio of patents, copyrights, trademarks, trade secrets and other intellectual property to protect their proprietary technologies. We believe that we have in place appropriate procedures and safeguards to help ensure that we do not violate a third party's intellectual property rights. However, no set of procedures and safeguards is infallible. We may unknowingly and inadvertently take action that is inconsistent with a third party's intellectual property rights, despite our efforts to do otherwise. Any such claims from third parties, with or without merit, could be time consuming, result in costly litigation, result in injunctions, require product modifications, cause product shipment delays or require us to enter into royalty or licensing arrangements. Such claims could have a material adverse effect on our results of operations and financial condition.

Much of our litigation in recent years have involved disputes over our and others' rights to technology. See Item 3. "Legal Proceedings."

To protect the confidentiality of our proprietary and trade secret information, we require employees, consultants, contractors, advisors and collaborators to enter into confidentiality agreements. Our customer data license and acquisition agreements also identify our proprietary, confidential information and require that such proprietary information be kept confidential. While these steps are taken to strictly maintain the confidentiality of our proprietary and trade secret information, it is difficult to ensure that unauthorized use, misappropriation or disclosure will not occur. If we are unable to maintain the secrecy of our proprietary, confidential information, we could be materially adversely affected.

If we do not effectively manage our transition into new services and products, our revenues may suffer.

Services and products for the geophysical industry are characterized by rapid technological advances in hardware performance, software functionality and features, frequent introduction of new services and products, and improvement in price characteristics relative to product and service performance. Among the risks associated with the introduction of new services and products are delays in development or manufacturing, variations in costs, delays in customer purchases or reductions in price of existing products in anticipation of new introductions, write-offs or write-downs of the carrying costs of inventory and raw materials associated with prior generation products, difficulty in predicting customer demand for new product and service offerings and effectively managing inventory levels so that they are in line with anticipated demand, risks associated with customer qualification, evaluation of new products,

and the risk that new products may have quality or other defects or may not be supported adequately by application software. The introduction of new services and products by our competitors also may result in delays in customer purchases and difficulty in predicting customer demand. If we do not make an effective transition from existing services and products to future offerings, our revenues and margins may decline.

Furthermore, sales of our new services and products may replace sales, or result in discounting of some of our current product or service offerings, offsetting the benefits of a successful introduction. In addition, it may be difficult to ensure performance of new services and products in accordance with our revenue, margin and cost estimations and to achieve operational efficiencies embedded in our estimates. Given the competitive nature of the seismic industry, if any of these risks materializes, future demand for our services and products, and our future results of operations, may suffer.

Global economic conditions and credit market uncertainties could have an adverse effect on customer demand for certain of our services and products, which in turn would adversely affect our results of operations, our cash flows, our financial condition and our stock price.

Historically, demand for our services and products has been sensitive to the level of exploration spending by E&P companies and geophysical contractors. The demand for our services and products will be lessened if exploration expenditures by E&P companies are reduced. During periods of reduced levels of exploration for oil and natural gas, there have been oversupplies of seismic data and downward pricing pressures on our seismic services and products, which, in turn, have limited our ability to meet sales objectives and maintain profit margins for our services and products. In the past, these then-prevailing industry conditions have had the effect of reducing our revenues and operating margins. The markets for oil and gas historically have been volatile and may continue to be so in the future. Turmoil or uncertainty in the credit markets and its potential impact on the liquidity of major financial institutions may have an adverse effect on our ability to fund our business strategy through borrowings under either existing or new debt facilities in the public or private markets and on terms we believe to be reasonable. Likewise, there can be no assurance that our customers will be able to borrow money for their working capital or capital expenditures on a timely basis or on reasonable terms, which could have a negative impact on their demand for our services and products and impair their ability to pay us for our services and products on a timely basis, or at all.

Our sales have historically been affected by interest rate fluctuations and the availability of liquidity, and we and our customers would be adversely affected by increases in interest rates or liquidity constraints. This could have a material adverse effect on our business, results of operations, financial condition and cash flows.

The loss of any significant customer or the inability of our customers to meet their payment obligations to us could materially and adversely affect our results of operations and financial condition.

Our business is exposed to risks related to customer concentration. While no single customer represented 10% or more of our consolidated net revenues for 2015 and 2014; in 2016, we had one customer with sales that exceeded 10%. Our top five customers together accounted for approximately 50%, 36% and 35%, of our consolidated net revenues during 2016, 2015 and 2014. The loss of any of our significant customers or deterioration in our relations with any of them could materially and adversely affect our results of operations and financial condition.

During the last ten years, our traditional seismic contractor customers have been rapidly consolidating, thereby consolidating the demand for our services and products. The loss of any of our significant customers to further consolidation could materially and adversely affect our results of operations and financial condition.

Our business is exposed to risks of loss resulting from nonpayment by our customers. Many of our customers finance their activities through cash flow from operations, the incurrence of debt or the issuance of equity. Declines in commodity prices, and the credit markets could cause the availability of credit to be constrained. The combination of lower cash flow due to commodity prices, a reduction in borrowing bases under reserve-based credit facilities and the lack of available debt or equity financing may result in a significant reduction in our customers' liquidity and ability to pay their obligations to us. Furthermore, some of our customers may be highly leveraged and subject to their own operating and regulatory risks, which increases the risk that they may default on their obligations to us. The inability or failure of our significant customers to meet their obligations to us or their insolvency or liquidation may adversely affect our financial results.

Our stock price has been volatile from time to time, declining precipitously from time to time during the period from 2008 through the present, and it could decline again.

The securities markets in general and our common stock in particular have experienced significant price and volume volatility in recent years. The market price and trading volume of our common stock may continue to experience significant fluctuations due not only to general stock market conditions but also to a change in sentiment in the market

regarding our operations or business prospects or those of companies in our industry. In addition to the other risk factors discussed in this section, the price and volume volatility of our common stock may be affected by:

- operating results that vary from the expectations of securities analysts and investors;
- factors influencing the levels of global oil and natural gas exploration and exploitation activities, such as the decline in crude oil prices and depressed prices for natural gas in North America or disasters such as the Deepwater Horizon incident in the Gulf of Mexico in 2010;

the operating and securities price performance of companies that investors or analysts consider comparable to us; actions by rating agencies related to the Notes; announcements of strategic developments, acquisitions and other material events by us or our competitors; and changes in global financial markets and global economies and general market conditions, such as interest rates, commodity and equity prices and the value of financial assets.

To the extent that the price of our common stock remains at lower levels or declines further, our ability to raise funds through the issuance of equity or otherwise use our common stock as consideration will be reduced. In addition, a low price for our equity may negatively impact our ability to access additional debt capital. These factors may limit our ability to implement our operating and growth plans.

On February 4, 2016, we completed a one-for-fifteen reverse stock split, and our stock began trading on a reverse-split adjusted basis on February 5, 2016.

Goodwill, intangible assets and multi-client data library that we have recorded are subject to impairment evaluations and, as a result, we could be required to write-off additional goodwill and intangible assets. In addition, portions of our products inventory may become obsolete or excessive due to future changes in technology, changes in market demand, or changes in market expectations. Write-downs of these assets may adversely affect our financial condition and results of operations.

In accordance with Accounting Standard Codification (“ASC”) 350, “Intangibles – Goodwill and Other” (“ASC 350”), we are required to compare the fair value of our goodwill and intangible assets (when certain impairment indicators under ASC 350 are present) to their carrying amount. If the fair value of such goodwill or intangible assets is less than its carrying value, an impairment loss is recorded to the extent that the fair value of these assets within the reporting units is less than their carrying value.

In 2014, we recorded an impairment charge of \$21.9 million related to our goodwill in our Devices reporting unit. For goodwill testing purposes, the litigation contingency accrual of \$123.8 million as of December 31, 2014 was assigned to this reporting unit. Based on this accrual and the recording of a valuation allowance on substantially all of our net deferred tax assets, this reporting unit’s carrying value was negative as of December 31, 2014. The negative carrying value required us to perform Step 2 of the impairment test on Devices; the test determined that the goodwill associated with this reporting unit was impaired. We also recorded a \$1.4 million impairment of certain intangible assets related to customer relationships, and we recorded a \$100.1 million impairment of our multi-client data library within our E&P Technology & Services segment at December 31, 2014.

Further reductions in or an impairment of the value of our goodwill or other intangible assets will result in additional charges against our earnings, which could have a material adverse effect on our reported results of operations and financial position in future periods. At December 31, 2016, our remaining goodwill and other intangible asset balances were \$22.2 million and \$3.1 million, respectively.

Our services and products’ technologies often change relatively quickly. Phasing out of old products involves estimating the amounts of inventories we need to hold to satisfy demand for those products and satisfy future repair part needs. Based on changing technologies and customer demand, we may find that we have either obsolete or excess inventory on hand. Because of unforeseen future changes in technology, market demand or competition, we might have to write off unusable inventory, which would adversely affect our results of operations. For the year ended December 31, 2016, the reserve for excess and obsolete inventory decreased due to the transfer of reserved ocean bottom equipment from inventory to property, plant, equipment and seismic rental equipment, net, to be used in Ocean Bottom Services contracts, partially offset by an expense accrual to increase our reserve for excess and obsolete inventories by \$0.4 million.

Due to the international scope of our business activities, our results of operations may be significantly affected by currency fluctuations.

We derived approximately 78% of our 2016 consolidated net revenues from international sales, subjecting us to risks relating to fluctuations in currency exchange rates. Currency variations can adversely affect margins on sales of our products in countries outside of the United States and margins on sales of products that include components obtained from suppliers located outside of the United States. Through our subsidiaries, we operate in a wide variety of jurisdictions, including the United Kingdom, Latin America, Australia, the Netherlands, Brazil, China, Canada, Russia, the United Arab Emirates, Egypt and other countries. Certain of these countries have experienced geopolitical instability, economic problems and other uncertainties from time to time. To the extent that world events or economic conditions negatively affect our future sales to customers in these and other regions of the world, or the collectability of receivables, our future results of operations, liquidity and financial condition may be adversely affected. The decline in crude oil prices, as well as U.S. and European Union sanctions against Russia related to its actions in Ukraine, have both contributed to the devaluation of the Russian Ruble putting significant pressure on our Russian-based customers and negatively impacting the appeal of seismic data located in Russia to potential non-Russian buyers. The Russian Ruble declined sharply throughout 2015 and into January 2016, reaching its lowest level since the currency was redenominated in 1998, before partially recovering during 2016. Our results of operations, liquidity and financial condition related to our operations in Russia are primarily denominated in U.S. dollars. In addition, the British Pound Sterling experienced significant devaluation beginning in mid-2016 following the vote by the British people to leave the European Union (“Brexit”) impacting our GBP-denominated balances. To the extent that world events or economic conditions negatively affect our future sales to customers in many regions of the world, as well as the collectability of our existing receivables, our future results of operations, liquidity and financial condition would be adversely affected.

We currently require customers in certain higher risk countries to provide their own financing. We do not currently extend long-term credit through notes to companies in countries where we perceive excessive credit risk.

Our consolidated balance sheet at December 31, 2016 reflected approximately \$8.0 million of net working capital related to our foreign subsidiaries, a majority of which is within the United Kingdom. Our subsidiaries in the U.K. and in other countries receive their income and pay their expenses primarily in their local currencies. To the extent that transactions of these subsidiaries are settled in their local currencies, a devaluation of those currencies versus the U.S. dollar could reduce the contribution from these subsidiaries to our consolidated results of operations as reported in U.S. dollars. For financial reporting purposes, such depreciation will negatively affect our reported results of operations since earnings denominated in foreign currencies would be converted to U.S. dollars at a decreased value. In addition, since we participate in competitive bids for sales of certain of our services and products that are denominated in U.S. dollars, a depreciation of the U.S. dollar against other currencies could harm our competitive position relative to other companies. While we periodically employ economic cash flow and fair value hedges to minimize the risks associated with these exchange rate fluctuations, the hedging activities may be ineffective or may not offset more than a portion of the adverse financial impact resulting from currency variations. Accordingly, we cannot provide assurance that fluctuations in the values of the currencies of countries in which we operate will not materially adversely affect our future results of operations.

We rely on highly skilled personnel in our businesses, and if we are unable to retain or motivate key personnel or hire qualified personnel, we may not be able to effectively operate our business.

Our performance is largely dependent on the talents and efforts of highly skilled individuals. Our future success depends on our continuing ability to identify, hire, develop, motivate and retain skilled personnel for all areas of our organization. We require highly skilled personnel to operate and provide technical services and support for our businesses. Competition for qualified personnel required for our data processing operations and our other businesses has intensified in recent years. A well-trained, motivated and adequately-staffed work force has a positive impact on our ability to attract and retain business. Our continued ability to compete effectively depends on our ability to attract new employees and to retain and motivate our existing employees.

However, from time to time, we have to rightsize our work force due to economic and market conditions. We initiated workforce reductions in December 2014, continuing into 2015, and reduced our full-time employee base by

approximately 50%. We also reduced salaries by 10% for the majority of our employees for the foreseeable future. In April 2016, the Company implemented additional cost saving initiatives by reducing its current workforce by approximately 12%.

Sales in the open market of shares of our common stock may have the effect of reducing the then current market price for our common stock.

On December 22, 2016, we announced that we filed a prospectus supplement under which we may sell up to \$20.0 million of our common stock through an "at-the-market" equity offering program (the "ATM Program"). We intend to use the net proceeds from sales under the ATM Program for general corporate purposes. The timing of any sales will depend on a variety of factors to be determined by us. As of December 31, 2016, no shares were sold under the program.

During 2009, we issued in a privately-negotiated transaction 1.23 million shares of our common stock to certain institutional investors. In March 2010, we issued 1.58 million shares to BGP in a privately-negotiated transaction in connection with the formation of our INOVA Geophysical joint venture. These shares may be resold into the public markets in sale transactions pursuant to currently-effective registration statements filed with the SEC or pursuant to another exemption from registration. Sales in the public market of a large number of shares of common stock (or the perception that such sales could occur) could apply downward pressure on the prevailing market price of our common stock. The numbers of shares have been retroactively adjusted to reflect the one-for-fifteen reverse stock split completed on February 4, 2016.

Shares of our common stock are also subject to certain demand and piggyback registration rights held by Laitram, L.L.C., an affiliate of one of our directors. We also may enter into additional registration rights agreements in the future in connection with any subsequent acquisitions or securities transactions we may undertake. Any sales of our common stock under these registration rights arrangements with Laitram or other stockholders could be negatively perceived in the trading markets and negatively affect the price of our common stock. Sales of a substantial number of our shares of common stock in the public market under these arrangements, or the expectation of such sales, could cause the market price of our common stock to decline.

Certain of our facilities could be damaged by hurricanes and other natural disasters, which could have an adverse effect on our results of operations and financial condition.

Certain of our facilities are located in regions of the United States that are susceptible to damage from hurricanes and other weather events, and, during 2005, were impacted by hurricanes or other weather events. Our Devices group leases 150,000 square feet of facilities located in Harahan, Louisiana, in the greater New Orleans metropolitan area. In late August 2005, we suspended operations at these facilities and evacuated and locked down the facilities in preparation for Hurricane Katrina. These facilities did not experience flooding or significant damage during or after the hurricane. However, because of employee evacuations, power failures and lack of related support services, utilities and infrastructure in the New Orleans area, we were unable to resume full operations at the facilities until late September 2005. In September 2008, we lost power and related services for several days at our offices located in the Houston metropolitan area, which includes a substantial portion of our data processing infrastructure, and in Harahan, Louisiana, as a result of Hurricane Ike and Hurricane Gustav.

Future hurricanes or similar natural disasters that impact our facilities may negatively affect our financial position and operating results for those periods. These negative effects may include reduced production, product sales and data processing revenues; costs associated with resuming production; reduced orders for our services and products from customers that were similarly affected by these events; lost market share; late deliveries; additional costs to purchase materials and supplies from outside suppliers; uninsured property losses; inadequate business interruption insurance and an inability to retain necessary staff. To the extent that climate change increases the severity of hurricanes and other weather events, as some have suggested, it could worsen the severity of these negative effects on our financial position and operating results.

Our operations, and the operations of our customers, are subject to numerous government regulations, which could adversely limit our operating flexibility. Regulatory initiatives undertaken from time to time, such as restrictions, sanctions and embargoes, can adversely affect, and have adversely affected, our customers and our business.

In addition to the specific regulatory risks discussed elsewhere in this Item 1A. "Risk Factors" section, our operations are subject to other laws, regulations, government policies and product certification requirements worldwide. Changes in such laws, regulations, policies or requirements could affect the demand for our products or services or result in the need to modify our services and products, which may involve substantial costs or delays in sales and could have an adverse effect on our future operating results. Our export activities in particular are subject to extensive and evolving trade regulations. Certain countries are subject to restrictions, including most recently Russia, sanctions and embargoes imposed by the United States government. These restrictions, sanctions and embargoes also prohibit or limit us from participating in certain business activities in those countries. In addition, our operations are subject to numerous local, state and federal laws and regulations in the United States and in foreign jurisdictions concerning the containment and disposal of hazardous materials, the remediation of contaminated properties, and the protection of the

environment. These laws have been changed frequently in the past, and there can be no assurance that future changes will not have a material adverse effect on us. In addition, our customers' operations are also significantly impacted by laws and regulations concerning the protection of the environment and endangered species. Consequently, changes in governmental regulations applicable to our customers may reduce demand for our services and products. To the extent that our customers' operations are disrupted by future laws and regulations, our business and results of operations may be materially and adversely affected.

Offshore oil and gas exploration and development recently has been a regulatory focus. Future changes in laws or regulations regarding such activities, and decisions by customers, governmental agencies or other industry participants in response, could reduce demand for our services and products, which could have a negative impact on our financial position, results of operations or cash flows. New emissions standards or other environmental regulations imposed on off-shore vessels,

for example, could increase our cost of procuring seismic acquisition vessels, cause unexpected downtime or decrease vessel availability. We cannot reasonably or reliably estimate that such changes will occur, when they will occur, or whether they will impact us. Such changes can occur quickly within a region, which may impact both the affected region and global exploration and production, and we may not be able to respond quickly, or at all, to mitigate these changes. In addition, these future laws and regulations could result in increased compliance costs or additional operating restrictions that may adversely affect the financial health of our customers and decrease the demand for our services and products.

Climate change regulations or legislation could result in increased operating costs and reduced demand for the oil and gas our clients intend to produce.

Legislative and regulatory measures to address climate change and greenhouse gas emissions are in various phases of discussion or implementation. Under the Federal Clean Air Act, the EPA requires that new stationary sources of significant greenhouse gas emissions or major modifications of existing facilities obtain permits covering such emissions. The EPA recently adopted final regulations that set methane emissions standards for new oil and natural gas emission sources. In addition, the EPA issued draft guidelines for voluntarily reducing emissions from existing equipment and processes in the oil and natural gas industry and is moving toward the regulation of emissions from existing sources as well. Further, the U.S. Congress has from time to time considered bills that would establish a cap-and-trade program to reduce emissions of greenhouse gases. Legislation or regulation that aims to reduce greenhouse gas emissions could also include carbon taxes, restrictive permitting, increased efficiency standards, and incentives or mandates to conserve energy or use renewable energy sources. Federal, state or local governments may, for example, provide tax advantages and other subsidies to support alternative energy sources, mandate the use of specific fuels or technologies, or promote research into new technologies to reduce the cost and increase the scalability of alternative energy sources. These climate change and greenhouse gas initiatives could increase our costs and downtime and reduce the demand for our services and products. Reductions in our revenues or increases in our expenses as a result of climate control initiatives could have adverse effects on our business, financial position, results of operations and prospects.

We have outsourcing arrangements with third parties to manufacture some of our products. If these third party suppliers fail to deliver quality products or components at reasonable prices on a timely basis, we may alienate some of our customers and our revenues, profitability and cash flow may decline. Additionally, current global economic conditions could have a negative impact on our suppliers, causing a disruption in our vendor supplies. A disruption in vendor supplies may adversely affect our results of operations.

Our manufacturing processes require us to purchase quality components. In addition, we use contract manufacturers as an alternative to our own manufacturing of products. We have outsourced the manufacturing of our products, including our towed marine streamers, geophone manufacturing and ocean bottom cables. Certain components used in our towed marine manufacturing operations are currently provided by a single supplier. Without these sole suppliers, we would be required to find other suppliers who could build these components for us, or set up to make these parts internally. If, in implementing any outsource initiative, we are unable to identify contract manufacturers willing to contract with us on competitive terms and to devote adequate resources to fulfill their obligations to us or if we do not properly manage these relationships, our existing customer relationships may suffer. In addition, by undertaking these activities, we run the risk that the reputation and competitiveness of our services and products may deteriorate as a result of the reduction of our control over quality and delivery schedules. We also may experience supply interruptions, cost escalations and competitive disadvantages if our contract manufacturers fail to develop, implement, or maintain manufacturing methods appropriate for our products and customers.

Reliance on certain suppliers, as well as industry supply conditions, generally involves several risks, including the possibility of a shortage or a lack of availability of key components, increases in component costs and reduced control over delivery schedules. If any of these risks are realized, our revenues, profitability and cash flows may decline. In addition, the more we come to rely on contract manufacturers, we may have fewer personnel resources with expertise to manage problems that may arise from these third-party arrangements.

Additionally, our suppliers could be negatively impacted by current global economic conditions. If certain of our suppliers were to experience significant cash flow issues or become insolvent as a result of such conditions, it could

result in a reduction or interruption in supplies to us or a significant increase in the price of such supplies and adversely impact our results of operations and cash flows.

Our business is subject to cybersecurity risks and threats.

Threats to our information technology systems associated with cybersecurity risk and cyber incidents or attacks continue to grow. It is also possible that breaches to our systems could go unnoticed for some period of time. Risks associated with these threats include, among other things, loss of intellectual property, impairment of our ability to conduct our operations, disruption of our customers' operations, loss or damage to our customer data delivery systems, and increased costs to prevent, respond to or mitigate cybersecurity events.

Our certificate of incorporation and bylaws, Delaware law and certain contractual obligations under our agreement with BGP contain provisions that could discourage another company from acquiring us.

Provisions of our certificate of incorporation and bylaws, Delaware law and the terms of our investor rights agreement with BGP may have the effect of discouraging, delaying or preventing a merger or acquisition that our stockholders may consider favorable, including transactions in which you might otherwise receive a premium for shares of our common stock. These provisions include:

- authorizing the issuance of “blank check” preferred stock without any need for action by stockholders;
- providing for a classified board of directors with staggered terms;
- requiring supermajority stockholder voting to effect certain amendments to our certificate of incorporation and bylaws;
- eliminating the ability of stockholders to call special meetings of stockholders;
- prohibiting stockholder action by written consent; and
- establishing advance notice requirements for nominations for election to the board of directors or for proposing matters that can be acted on by stockholders at stockholder meetings.

In addition, the terms of our INOVA Geophysical joint venture with BGP and BGP’s investment in our company contain a number of provisions, such as certain pre-emptive rights granted to BGP with respect to certain future issuances of our stock, that could have the effect of discouraging, delaying or preventing a merger or acquisition of our company that our stockholders may otherwise consider to be favorable.

Failure to maintain effective internal controls in accordance with Section 404 of the Sarbanes-Oxley Act could have a material adverse effect on our stock price.

If, in the future, we fail to maintain the adequacy of our internal controls, as such standards are modified, supplemented or amended from time to time, we may not be able to ensure that we can conclude on an ongoing basis that we have effective internal controls over financial reporting in accordance with Section 404 of the Sarbanes-Oxley Act. Failure to achieve and maintain an effective internal control environment could have a material adverse effect on the price of our common stock.

Note: The foregoing factors pursuant to the Private Securities Litigation Reform Act of 1995 should not be construed as exhaustive. In addition to the foregoing, we wish to refer readers to other factors discussed elsewhere in this report as well as other filings and reports with the SEC for a further discussion of risks and uncertainties that could cause actual results to differ materially from those contained in forward-looking statements. We undertake no obligation to publicly release the result of any revisions to any such forward-looking statements, which may be made to reflect the events or circumstances after the date hereof or to reflect the occurrence of unanticipated events.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

Our principal operating facilities at December 31, 2016 were as follows:

Operating Facilities	Square Footage	Segment
Houston, Texas	226,000	Global Headquarters, E&P Technology & Services and Ocean Bottom Services
Harahan, Louisiana	150,000	Devices group within E&P Operations Optimization
Edinburgh, Scotland	16,000	Optimization Software & Services group within E&P Operations Optimization
Chertsey, England	19,000	E&P Technology & Services
Jebel Ali, Dubai, United Arab Emirates	1,000	International Sales Headquarters
	412,000	

Each of these operating facilities is leased by us under long-term lease agreements. These lease agreements have terms that expire ranging from 2017 to 2025. See Footnote 13 “Operating Leases” of Footnotes to Consolidated Financial Statements.

In addition, we lease offices in Beijing, China; Rio de Janeiro, Brazil; and Moscow, Russia to support our global sales force. We lease offices for our seismic data processing centers in Port Harcourt, Nigeria; Luanda, Angola; Cairo, Egypt; Villahermosa, Mexico; Rio de Janeiro; and Brazil. We also lease other facilities in Stafford, Texas; and Calgary, Canada. Our executive headquarters is located at 2105 CityWest Boulevard, Suite 100, Houston, Texas. The machinery, equipment, buildings and other facilities owned and leased by us are considered by our management to be sufficiently maintained and adequate for our current operations.

Item 3. Legal Proceedings

WesternGeco

In June 2009, WesternGeco filed a lawsuit against us in the United States District Court for the Southern District of Texas, Houston Division. In the lawsuit, styled WesternGeco L.L.C. v. ION Geophysical Corporation, WesternGeco alleged that we had infringed several method and apparatus claims contained in four of its United States patents regarding marine seismic streamer steering devices.

The trial began in July 2012. A verdict was returned by the jury in August 2012, finding that we infringed the claims contained in the four patents by supplying our DigiFIN lateral streamer control units and the related software from the United States and awarded WesternGeco the sum of \$105.9 million in damages, consisting of \$12.5 million in reasonable royalty and \$93.4 million in lost profits.

In June 2013, the presiding judge entered a Memorandum and Order, denying our post-verdict motions that challenged the jury's infringement findings and the damages amount. In the Memorandum and Order, the judge also stated that WesternGeco is entitled to be awarded supplemental damages for the additional DigiFIN units that were supplied from the United States before and after trial that were not included in the jury verdict due to the timing of the trial. In October 2013, the judge entered another Memorandum and Order, ruling on the number of DigiFIN units that are subject to supplemental damages and also ruling that the supplemental damages applicable to the additional units should be calculated by adding together the jury's previous reasonable royalty and lost profits damages awards per unit, resulting in supplemental damages of \$73.1 million.

In April 2014, the judge entered another Order, ruling that lost profits should not have been included in the calculation of supplemental damages in the October 2013 Memorandum and Order and reducing the supplemental damages award in the case from \$73.1 million to \$9.4 million. In the Order, the judge also further reduced the damages award in the case by \$3.0 million to reflect a settlement and license that WesternGeco entered into with a customer of ours that had purchased and used DigiFIN units that were also included in the damage amounts awarded against us.

In May 2014, the judge signed and entered a Final Judgment against us in the amount of \$123.8 million. The Final Judgment also included an injunction that enjoins us, our agents and anyone acting in concert with us, from supplying in or from the United States the DigiFIN product or any parts unique to the DigiFIN product, or any instrumentality no more than colorably different from any of these products or parts, for combination outside of the United States. We have conducted our business in compliance with the district court's orders in the case, and we have reorganized our operations such that we no longer supply the DigiFIN product or any parts unique to the DigiFIN product in or from the United States.

We and WesternGeco each appealed the Final Judgment to the United States Court of Appeals for the Federal Circuit in Washington, D.C. On July 2, 2015, the Court of Appeals reversed in part the Final Judgment, holding the district court erred by including lost profits in the Final Judgment. Lost profits were \$93.4 million and prejudgment interest on the lost profits was approximately \$10.9 million of the \$123.8 million Final Judgment. Pre-judgment interest on the lost profits portion will be treated in the same way as the lost profits. Post-judgment interest will likewise be treated in the same fashion. On July 29, 2015, WesternGeco filed a petition for rehearing en banc before the Court of Appeals. On October 30, 2015 the Court of Appeals denied WesternGeco's petition for rehearing en banc.

As previously disclosed, we had previously taken a loss contingency accrual of \$123.8 million. As a result of the reversal by the Court of Appeals, as of June 30, 2015, we reduced our loss contingency accrual to \$22.0 million. In February 26, 2016, WesternGeco filed a petition for writ of certiorari by the Supreme Court. We filed our response on April 27, 2016. Subsequently, on June 20, 2016, the Supreme Court refused to disturb the Court of Appeals ruling finding no lost profits as a matter of law. Separately, in light of the changes in case law regarding the standard of proof for willfulness in the Halo and Stryker cases, the Supreme Court indicated that the case should be remanded to

the Federal Circuit for a determination of whether or not the willfulness determination by the District Court was appropriate.

On October 14, 2016, the United States Court of Appeals for the Federal Circuit issued a mandate returning the case to the District Court for consideration of whether or not additional damages for willfulness are appropriate. We will argue enhancement is not proper here under the new law, just as it was not under prior law, but in any event should be based on the royalty award, not the award plus interest.

On November 14, 2016, the District Court issued an order reducing the amount of the appeal bond from \$120.0 million to \$65.0 million dollars, ordered the sureties to pay principal and interest on the royalty previously awarded and declined to issue a final judgment until after consideration of whether enhanced damages related to willfulness should be awarded in the case. While we do not agree with the unusual decision by the District Court ordering payment of the royalty damages and interest without a final judgment, we paid the \$20.8 million due pursuant to the order to WesternGeco on November 25, 2016, after this payment, the remaining \$1.1 million accrual was reversed to zero. The district court previously refused WesternGeco's request for additional damages for willfulness, but a change in the law in June 2016, permitted WesternGeco to renew its request, we have opposed WesternGeco's motion. WesternGeco has also filed a motion in the U.S. Supreme Court indicating it intends to appeal the lost profits again. We will oppose WesternGeco's second attempt to appeal to the Supreme Court matters it did not succeed on in its appeal last year (among other reasons). After issuance of a final judgement, we will decide whether or not to pursue available appeals regarding the decision. For additional discussion about our liquidity related to posting an appeal bond, see Item 7. "Management's Discussion and Analysis of Financial Condition and Results of Operations - Meeting our Liquidity Requirements - Loss Contingency - WesternGeco Lawsuit" in Part II of this Form 10-K. Prior to the reduction in damages by the Court of Appeals, we arranged with sureties to post an appeal bond at the District Court. The appeal bond is uncollateralized, but the terms of the appeal bond arrangements provide the sureties the contractual right for as long as the bond is outstanding to require the us to post cash collateral. In light of the payment of the \$20.8 million in royalty damages us, the sureties filed motions on December 30, 2016 to have the appeal bond dismissed.

We may not ultimately prevail in the appeals process and we could be required to pay any additional amount ordered by the court up to approximately \$44.0 million. Our assessment that we do not have a loss contingency may change in the future due to developments at the appellate court and other events, such as changes in applicable law, and such reassessment could lead to the determination that a loss contingency is probable, which could have a material effect on our business, financial condition and results of operations. Our assessments disclosed in this Annual Report on Form 10-K or elsewhere are based on currently available information and involve elements of judgment and significant uncertainties. Actual losses may exceed or be considerably less than than payments we made in 2016.

Other Litigation

We have been named in various other lawsuits or threatened actions that are incidental to our ordinary business. Litigation is inherently unpredictable. Any claims against us, whether meritorious or not, could be time-consuming, cause us to incur costs and expenses, require significant amounts of management time and result in the diversion of significant operational resources. The results of these lawsuits and actions cannot be predicted with certainty. We currently believe that the ultimate resolution of these matters will not have a material adverse effect on our 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

Our common stock trades on the New York Stock Exchange ("NYSE") under the symbol "IO." The following table sets forth the high and low sales prices of the common stock for the periods indicated, as reported in NYSE composite tape transactions as adjusted for the one-for-fifteen reverse stock split completed on February 4, 2016.

Period	Price Range	
	High (1)	Low (1)
Year ended December 31, 2016:		
Fourth Quarter	\$8.40	\$5.65
Third Quarter	6.99	4.73
Second Quarter	9.65	5.45
First Quarter	9.50	5.10
Year ended December 31, 2015:		
Fourth Quarter	\$12.15	\$3.90
Third Quarter	21.75	5.55
Second Quarter	37.20	15.60
First Quarter	43.05	31.50

(1) Prior to 2016, the high and low sales prices set forth in the table above have been retroactively adjusted to reflect the one-for-fifteen reverse stock split completed on February 4, 2016.

We have not historically paid, and do not intend to pay in the foreseeable future, cash dividends on our common stock. We presently intend to retain cash from operations for use in our business, with any future decision to pay cash dividends on our common stock dependent upon our growth, profitability, financial condition and other factors our board of directors consider relevant. In addition, the terms of our Credit Facility and the indenture governing the Notes prohibit us from paying dividends on or repurchasing shares of our common stock without the prior consent of the lenders.

The terms of our Credit Facility contain covenants that restrict us from paying cash dividends on our common stock, or repurchasing or acquiring shares of our common stock, unless (i) there is no event of default under the Credit Facility, (ii) there is excess availability under the Credit Facility greater than \$20.0 million (or, at the time that the borrowing base formula amount is less than \$20.0 million, the borrowers' level of liquidity (as defined in the revolving credit and security agreement) is greater than \$20.0 million) and (iii) the agent receives satisfactory projections showing that excess availability under the Credit Facility for the immediately following period of ninety (90) consecutive days will not be less than \$20.0 million (or, at the time that the borrowing base formula amount is less than \$20.0 million, the borrowers' level of liquidity is greater than \$20.0 million). The aggregate amount of permitted cash dividends and stock repurchases may not exceed \$10.0 million in any fiscal year or \$40.0 million in the aggregate from and after the closing date of the Credit Facility.

The indenture governing the Notes contains certain covenants that, among other things, limit our ability to pay certain dividends or distributions on our common stock or purchase, redeem or retire shares of our common stock, unless (i) no default under the indenture has occurred or would occur as a result of that payment, (ii) we would have, after giving pro forma effect to the payment, been permitted to incur at least \$1.00 of additional indebtedness under a fixed charge coverage ratio test under the indenture, and (iii) the total cumulative amount of all such payments would not exceed a sum calculated by reference to, among other items, our consolidated net income, proceeds from certain sales of equity or assets, certain conversions or exchanges of debt for equity and certain other reductions in our indebtedness and in aggregate not to exceed at any one time \$25.0 million.

On December 31, 2016, there were 705 holders of record of our common stock.

On November 4, 2015, our board of directors approved a stock repurchase program authorizing us to repurchase, from time to time from November 10, 2015 through November 10, 2017, up to \$25 million in shares of our outstanding

common stock. The stock repurchase program may be implemented through open market repurchases or privately negotiated transactions, at management's discretion. The actual timing, number and value of shares repurchased under the program will be determined by management at its discretion and will depend on a number of factors including the market price of the shares of our common stock and general market and economic conditions, applicable legal requirements and compliance with the terms of our outstanding indebtedness. The repurchase program does not obligate us to acquire any particular amount of common stock and may be modified or suspended at any time and could be terminated prior to completion. As of December 31, 2016, we were authorized to repurchase up to \$25 million through November 17, 2017 and had repurchased \$3 million or 451,792 shares of our common stock under the repurchase program at an average price per share of \$6.54. The number of shares repurchased and the average price per repurchased share has been retroactively adjusted to reflect the one-for-fifteen reverse stock split completed on February 4, 2016.

During the three months ended December 31, 2016, we withheld and subsequently canceled shares of our common stock to satisfy minimum statutory income tax withholding obligations on the vesting of restricted stock for employees. The date of cancellation, number of shares and average effective acquisition price per share, were as follows:

Period	(a) Total Number of Shares Acquired	(b) Average Price Paid Per Share	(c) Total Number of Shares Purchased as Part of Publicly Announced Plans or Program	(d) Maximum Number (or Approximate Dollar Value) of Shares That May Yet Be Purchased Under the Plans or Program
October 1, 2016 to October 31, 2016	—	\$ —	Not applicable	Not applicable
November 1, 2016 to November 30, 2016	—	\$ —	Not applicable	Not applicable
December 1, 2016 to December 31, 2016	1,707	\$ 7.40	Not applicable	Not applicable
Total	1,707	\$ 7.40		

Item 6. Selected Financial Data

Special Items Affecting Comparability

The selected consolidated financial data set forth below under “Historical Selected Financial Data” with respect to our consolidated statements of operations for 2016, 2015, 2014, 2013 and 2012, and with respect to our consolidated balance sheets at December 31, 2016, 2015, 2014, 2013 and 2012, have been derived from our audited consolidated financial statements.

Our results of operations and financial condition have been affected by restructuring activities, legal contingencies and settlements, dispositions, debt refinancings and impairments and write-downs of assets during the periods presented, which affect the comparability of the financial information shown. In particular, our results of operations for the fiscal years ended December 31, 2012 – 2016 time period were impacted by the following items (before tax):

	Years Ended December 31,				
	2016	2015	2014	2013	2012
	(In thousands)				
Cost of sales:					
Write-down of multi-client data library	\$—	\$(399)	\$(100,100)	\$(5,461)	\$—
Write-down of excess and obsolete inventory	\$(429)	\$(151)	\$(6,952)	\$(21,197)	\$(1,326)
Operating expenses:					
Impairment of goodwill and intangible assets	\$—	\$—	\$(23,284)	\$—	\$—
Write-down of receivables	\$—	\$—	\$(8,214)	\$(9,157)	\$(5,640)
Write-down of marine equipment	\$—	\$—	\$—	\$—	\$(5,928)
Other income (expense):					
Reversal of (accrual for) loss contingency related to legal proceedings	\$1,168	\$101,978	\$69,557	\$(183,327)	\$(10,000)
Gain on sale of Source product line	\$—	\$—	\$6,522	\$—	\$—
Gain on sale of cost method investments	\$—	\$—	\$5,463	\$3,591	\$—
Gain on legal settlements	\$—	\$—	\$—	\$—	\$30,895
Recovery of INOVA bad debts	\$3,983	\$—	\$—	\$—	\$—
Loss on bond exchange	\$(2,182)				
Equity in earnings (losses) of investments	\$—	\$—	\$(49,485)	\$(42,320)	\$297
Conversion payment of preferred stock	\$—	\$—	\$—	\$(5,000)	\$—

The historical selected financial data shown below should not be considered as being indicative of future operations, and should be read in conjunction with Item 7. “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and the consolidated financial statements and the notes thereto included elsewhere in this Form 10-K.

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Historical Selected Financial Data

	Years Ended December 31,				
	2016	2015	2014	2013	2012
	(In thousands, except for per share data)				
Statement of Operations Data:					
Net revenues	\$172,808	\$221,513	\$509,558	\$549,167	\$526,317
Gross profit	36,032	8,003	62,223	159,313	215,801
Income (loss) from operations	(43,171)	(100,632)	(117,929)	16,396	74,527
Net income (loss) applicable to common shares	(65,148)	(25,122)	(128,252)	(251,874)	61,963
Net income (loss) per basic share	\$(5.71)	\$(2.29)	\$(11.72)	\$(23.84)	\$5.97
Net income (loss) per diluted share	\$(5.71)	\$(2.29)	\$(11.72)	\$(23.84)	\$5.71
Weighted average number of common shares outstanding	11,400	10,957	10,939	10,567	10,387
Weighted average number of diluted shares outstanding	11,400	10,957	10,939	10,567	10,851
Balance Sheet Data (end of year):					
Working capital	\$16,555	\$93,160	\$222,099	\$248,857	\$164,693
Total assets	313,216	435,088	617,257	864,671	820,583
Long-term debt	158,790	182,992	190,594	220,152	105,328
Total equity	53,398	112,040	135,712	257,885	499,019
Other Data:					
Investment in multi-client library	\$14,884	\$45,558	\$67,785	\$114,582	\$145,627
Capital expenditures	1,488	19,241	8,264	16,914	16,650
Depreciation and amortization (other than multi-client library)	21,975	26,527	27,656	18,158	16,202
Amortization of multi-client library	33,335	35,784	64,374	86,716	89,080

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

Note: The following should be read in conjunction with our Consolidated Financial Statements and related Footnotes to Consolidated Financial Statements that appear elsewhere in this Annual Report on Form 10-K. References to "Footnotes" in the discussion below refer to the numbered Footnotes to Consolidated Financial Statements.

Executive Summary

Our Business

The terms "we," "us" and similar or derivative terms refer to ION Geophysical Corporation and its consolidated subsidiaries, except where the context otherwise requires or as otherwise indicated.

We are a global, technology-focused company that provides geophysical technology, services and solutions to the global oil and gas industry. We provide our services and products through three business segments – E&P Technology & Services, E&P Operations Optimization and Ocean Bottom Services (the segment name for OceanGeo) – as well as through our INOVA Geophysical joint venture.

For a full discussion of our business, see Part I, Item 1. "Business."

Macroeconomic Conditions

Demand for our services and products is cyclical and dependent upon activity levels in the oil and gas industry, particularly our customers' willingness to invest capital in the exploration for oil and natural gas. Our customers' capital spending programs are generally based on their outlook for near-term and long-term commodity prices, economic growth, commodity demand and estimates of resource production. As a result, demand for our services and products is largely sensitive to expected commodity prices, principally related to crude oil and natural gas.

The following is a summary of recent oil and gas pricing trends:

Quarter ended	Brent Crude (per bbl)		West Texas Intermediate Crude (per bbl)		Henry Hub Natural Gas (per mcf)	
	High	Low	High	Low	High	Low
12/31/2016	\$54.96	\$41.61	\$54.01	\$43.29	\$3.80	\$2.08
9/30/2016	\$49.66	\$40.00	\$49.02	\$39.50	\$3.19	\$2.67
6/30/2016	\$50.73	\$35.88	\$51.23	\$34.30	\$2.94	\$1.71
3/31/2016	\$40.54	\$26.01	\$41.45	\$26.19	\$2.54	\$1.49
12/31/2015	\$52.13	\$35.26	\$49.67	\$34.55	\$2.54	\$1.63
9/30/2015	\$61.73	\$41.59	\$56.94	\$38.22	\$2.93	\$2.47
6/30/2015	\$66.33	\$55.73	\$61.36	\$49.13	\$3.04	\$2.50
3/31/2015	\$61.89	\$45.13	\$53.56	\$43.39	\$3.32	\$2.62

Source: U.S. Energy
Information Administration
(EIA).

In the past few years, crude oil prices have been volatile due to global economic uncertainties. Significant downward oil price volatility began late 2014 and reached a low of an average of \$33 in early 2016 before improving to approximately \$55 per barrel by the end 2016. The average prices for West Texas Intermediate (“WTI”) and Intercontinental Exchange Brent (“Brent”) crude oil each increased to an average of \$49 per barrel, for the fourth quarter of 2016 from an average of \$40 per barrel each, for the first half of 2016. These average prices compare to an average price of \$49 per barrel and \$52 per barrel, respectively, for the full year 2015, and an average price of \$101 per barrel and \$109 per barrel, respectively, for the first nine months of 2014.

Prices for natural gas in the U.S. averaged \$2.40 per mmBtu for full year 2016 compared to \$2.62 per mmBtu for the full year 2015 and \$4.57 per mmBtu for the first nine months of 2014. As a result of natural gas production growth outpacing demand in the U.S., natural gas prices continue to be weak relative to prices experienced from 2006 through 2008 and are expected to remain below levels considered economical for new investments in numerous natural gas fields. Total U.S. natural gas in storage currently stands at 3.2 trillion cubic feet, 10.3% lower than levels at this time a year ago and 0.1% below the five-year average for this time of year. U.S. producers added nine rigs, consisting of seven oil rigs and two gas rigs during 2016, bringing the total U.S. rig count to 659 or 66% below the peak of 1931 rigs in the fourth quarter of 2014. If natural gas production continues to surpass U.S. natural gas demand, prices could remain constrained for an extended period of time.

The material decrease in crude oil prices can be attributed principally to high levels of global crude oil inventories resulting from significant production growth in the U.S. shale plays, the strengthening of the U.S. dollar relative to other foreign currencies, and OPEC increasing its production. Until recently, OPEC has demonstrated an unwillingness to cut its production. In late November 2016, OPEC reached agreement to cut its oil production by approximately 1.2 million barrels per day (bpd). An additional 0.6 million bpd is expected to come from non-OPEC participants such as Russia. Recently, the World Bank raised its 2017 forecast for crude oil prices to \$55 per barrel from \$53 per barrel as OPEC members prepare to limit production after a long period of unrestrained output. Inventories remain high with nearly 1 billion barrels that must be consumed to balance supply and demand. However, oil-price gains are likely to trigger increases in shale oil production in North America further growing U.S. crude supplies. In January, 2017, rig counts reached their highest levels in a year as North American drillers are expected to increase capital spending by over 25% in 2017. Given the historical volatility of crude prices, there is a continued risk that if prices do not continue to improve, or if they start to decline further due to high levels of crude oil production, there is a potential for slowing growth rates in various global regions and/or for ongoing supply/demand imbalances.

E&P companies use their cash flow from operations to reinvest in productive assets through capital expenditures, build surplus cash for eventual downturns, or return cash to stakeholders. After a period of exploration-focused activities by E&P companies leading up to the fourth quarter of 2014, many E&P companies turned their focus more to production activities and less on exploration of prospects through 2016 as the continued decline in oil and gas prices resulted in decreasing revenues, prompting cost reduction initiatives across the industry. In 2014, continuing through 2016, E&P companies decreased spending on exploration and were reportedly focusing more of their current spending towards production optimization of existing assets. We believe this was due to several factors, but primarily because operational cash flows of E&P companies were no longer sufficient to cover capital expenditures and cash was continuing to be paid to shareholders in the form of dividends. E&P companies have relied on asset sales and debt financings to fund capital requirements amid demands for greater returns to shareholders. The combination of these factors placed many E&P companies in a position where they were unable to cover both their capital expenditure budgets and targeted cash returns to shareholders. As a result, E&P companies have shifted their focus to spending reductions, with exploration spending receiving the largest reductions and seismic spending being one of the most discretionary parts of their exploration budgets. Similar to ION, many seismic industry participants have reported lower year-over-year revenues and decreased funding levels for contracts and multi-client exploration activities. As a result of this industry downturn, many customers have experienced a significant reduction in their liquidity with challenges accessing the capital markets. Several exploration and production companies have declared bankruptcy, or have had to exchange equity for the forgiveness of debt, while others have been forced to sell assets in an effort to preserve liquidity. Alternatively, if the global supply of oil were to decrease due to reduced capital investment by E&P companies, government instability in a major oil-producing nation or energy demand continues to increase in the U.S. and in countries such as China and India, a recovery in WTI and Brent crude oil prices could occur. Regardless of the driver, crude oil price improvements will not occur without a re-balancing of global supply and demand, the timing of which is difficult to predict. If commodity prices do not continue to improve or if they start to decline further, demand for our services and products could continue to decline.

Impact to Our Business

The reductions in exploration spending have had a significant impact on our results of operations for 2016 with total revenues falling by 22% versus prior year. Investments in our multi-client data library are dependent upon the timing of our new ventures projects and the availability of underwriting by our customers. During 2016, customer underwriting of our new venture programs remained soft. We continue to maintain high standards for underwriting of any new projects, and have delayed certain new venture programs that were originally planned to occur during 2016. We invested approximately \$31 million less in our multi-client data library during 2016, compared to 2015, and \$53 million less compared to 2014. Our asset light strategy enables us to scale our business to avoid significant fixed costs and to remain financially flexible as we manage the timing and levels of our capital expenditures.

During 2015, continuing into 2016, various customers delayed processing projects, which has negatively impacted Imaging Services revenues, and we expect the trend to continue into 2017. Starting in and continuing into 2016, we took measured actions to reduce our Imaging Services cost structure.

Our business has traditionally been seasonal, with the strongest demand for our services and products in the fourth quarter of our fiscal year. As discussed above, we have seen reduced levels of exploration-related spending by E&P companies as those companies focus more of their current spending on optimizing production of existing assets.

At December 31, 2016, our E&P Technology & Services segment backlog, which consists of commitments for (i) imaging services work and (ii) multi-client new venture and proprietary projects underwritten by our customers, increased 77% or \$14.7 million to \$33.9 million, compared with \$19.2 million at December 31, 2015. The majority of the increase in our backlog is due to our collaboration agreement with Schlumberger WesternGeco on the Campeche 3-D reimaging program. We anticipate that the majority of our backlog will be recognized as revenue over the first half of 2017.

Our Optimization Software & Services group revenues decreased for 2016 compared to the same period of 2015. This decline is a result of reduced activity by seismic contractors that have taken vessels out of service.

Our traditional seismic contractor customers are also experiencing weakened demand due to the reduction in seismic spend by their customers. As a result, our Devices group continues to experience weak year-over-year sales. Our

Devices group revenues decreased primarily because of lower towed streamer products sales and a decrease in repair and replacement marine positioning equipment revenues due to vessels having been taken out of service.

In 2014, we increased our ownership in OceanGeo, our ocean bottom seismic data acquisition joint venture, to 100%.

During 2016, our OceanGeo group completed data acquisition for an OBS survey offshore Nigeria, compared to our idle ocean bottom vessels and crew during 2015. We are actively pursuing tenders for long-term work in 2017.

We continue to monitor the global economy, the demand for crude oil and natural gas and the resultant impact on the capital spending plans and operations of our E&P customers in order to plan our business. We remain confident that, despite current marketplace issues that we describe above, we have positioned ourselves to take advantage of the next upturn in the energy cycle by shifting our focus more towards E&P solutions, accounting for 75% of our revenues in 2016, and less on equipment sales, and by diversifying our offerings across the E&P lifecycle.

It is our view that technologies that add a competitive advantage through improved imaging, cost reductions or improvements in well productivity will continue to be valued in our marketplace. We believe that our newest technologies, such as Calypso, WiBand, Orca, Narwhal, and Marlin, will continue to attract customer interest, because those technologies are designed to deliver improvements in image quality within more productive delivery systems.

Cost Reduction Initiatives

The recent decline in crude oil prices to five-year lows and the depressed level of natural gas prices have negatively impacted the economic outlook of the Company's exploration and production ("E&P") customers, which has also negatively impacted the outlook for the Company's seismic contractor customers. In response to the decline in crude oil prices, E&P companies have reduced their capital expenditures and shifted their spending from exploration activities to production-related activities on existing assets. Because seismic spending is discretionary, E&P companies have disproportionately cut their spending on seismic-related services and products.

During the second quarter of 2016, we implemented additional cost saving initiatives by reducing our current workforce by approximately 12%. These additional reductions were needed to further streamline our organization and right-size our company to bring it in line with our current revenue stream, while maintaining the necessary core capabilities to continue our operations and strategic initiatives. These additional reductions are expected to result in approximately \$15 million of annualized savings, in addition to the \$80 million of annual savings from prior cost reduction initiatives. By the fourth quarter of 2016, we began to realize the full savings from our last reduction initiatives. See Footnote 2 "Cost Reduction Initiative, Impairments, Restructurings and Other Charges" of Footnotes to Consolidated Financial Statements.

Reverse Stock Split and Increase in Authorized Shares

On February 1, 2016, our stockholders approved a reverse stock split at a ratio to be selected by our Board of Directors (or any authorized committee of the Board of Directors) from within a range of between one-for-five and one-for-fifteen, inclusive, and a proportionate reduction in the number of authorized shares of our common stock by the selected reverse split ratio. On February 4, 2016, we completed a one-for-fifteen reverse stock split, and our stock began trading on a reverse-split adjusted basis on February 5, 2016. As a result of the reverse stock split, the number of issued and outstanding shares was adjusted and the number of shares underlying outstanding stock options and the related exercise prices were adjusted. Following the effective date of the reverse stock split, the par value of our common stock remained at \$0.01 per share, and the number of authorized shares was reduced from 400,000,000 to 26,666,667, adjusted to reflect a one-for-fifteen reverse stock split.

On February 1, 2016, our stockholders approved an increase in the number of authorized shares of common stock from 200 million to 400 million, or 13.3 million to 26.7 million retroactively adjusted to reflect the one-for-fifteen reverse stock split.

Exchange Offer

On April 28, 2016, we successfully completed an exchange offer (the "Exchange Offer") and consent solicitation (the "Consent Solicitation") related to the Third Lien Notes. The Company did not receive any cash proceeds in connection with the Exchange Offer and Consent Solicitation.

Under the terms of the Exchange Offer, for each \$1,000 principal amount of Third Lien Notes validly tendered for exchange and not validly withdrawn by an eligible holder (an "Exchange Participant") prior to 11:59 P.M., New York City time, on April 25, 2016, and accepted for exchange by us, we offered the consideration (the "Exchange Consideration") of (i) \$1,000 principal amount of our new 9.125% Senior Secured Second Priority Notes due 2021 (the "Second Lien Notes" and collectively with the Third Lien Notes, the "Notes") plus (ii) either (a) for Third Lien Notes tendered at or prior to 4:59 P.M., New York City time, on Friday, April 15, 2016 (the "Extended Early Tender Deadline"), ten (10) shares of our common stock (the "Early Stock Consideration"), or (b) for Third Lien Notes tendered after the Extended Early Tender Deadline, seven (7) shares of our common stock (the "Stock Consideration") (such

shares issued as the Early Stock Consideration or the Stock Consideration, together with the Second Lien Notes, the “Exchange Securities”), upon the terms and subject to the conditions set forth in our confidential Offer to Exchange and related Consent and Letter of Transmittal, each dated March 28, 2016 (the “Offer Documents”).

As part of the Exchange Offer, each Exchange Participant had the opportunity to tender all or a portion of its Third Lien Notes for a cash payment in lieu of the Exchange Consideration upon the terms and subject to the conditions set forth in the Offer Documents (the “Cash Tender Option”). The aggregate amount of cash consideration that could be paid by us for tendered Third Lien Notes accepted for purchase pursuant to the Cash Tender Option was approximately \$15.0 million plus

accrued and unpaid interest to, but not including, the settlement date of the Exchange Offer (collectively, the “Cash Tender Cap”).

Concurrently with the Exchange Offer, we solicited consents from eligible holders to proposed amendments to the Third Lien Notes Indenture (the “Proposed Amendments”). The Proposed Amendments, among other things, provide for the release of the second priority security interest in the collateral securing the Third Lien Notes and the grant of a third priority security interest in the collateral, subordinate to liens securing all our senior and second priority indebtedness, including the Credit Facility (as defined below) and the Second Lien Notes, and eliminate substantially all of the restrictive covenants and certain events of default pertaining to the Third Lien Notes.

The Exchange Offer, including the Cash Tender Option, and the Consent Solicitation expired at 11:59 P.M., New York City time, on April 25, 2016. In total, we accepted for exchange approximately \$146.5 million in aggregate principal amount of the Third Lien Notes, or approximately 83.72% of the \$175 million outstanding aggregate principal amount of the Third Lien Notes, validly tendered and not withdrawn in the Exchange Offer. The Third Lien Notes validly tendered and not withdrawn in the Exchange Offer were accepted by us.

Because we received the necessary consents to effect the Proposed Amendments, any Third Lien Notes not validly tendered pursuant to the Exchange Offer remain outstanding and the holders are subject to the terms of the supplemental indenture implementing the Proposed Amendments. No consideration was paid to holders of Third Lien Notes in connection with the Consent Solicitation. After giving effect to the Exchange Offer and Consent Solicitation, the aggregate principal amount of the Third Lien Notes remaining outstanding was approximately \$28.5 million as of April 28, 2016, and such Third Lien Notes are secured on a third priority basis subordinated to the liens securing all senior and second priority indebtedness of the Company, including under the Credit Facility and Second Lien Notes. In exchange for approximately \$120.6 million in aggregate principal amount of Third Lien Notes, we issued approximately \$120.6 million aggregate principal amount of Second Lien Notes and 1,205,477 shares of our common stock, including 1,204,980 shares issued as Early Stock Consideration and 497 shares issued as Stock Consideration. The Company utilized 508,464 of treasury shares towards the total 1,205,477 shares issued. The securities issued in the Exchange Offer were issued in reliance on an exemption from registration set forth in Section 4(a)(2) of the Securities Act. The Company received no cash consideration in exchange for the issuance of the Exchange Securities. The Cash Tender Option was fully subscribed. Pursuant to the terms of the Exchange Offer, we accepted for purchase tendered Third Lien Notes at the lowest bid prices until the Cash Tender Cap was reached, subject to proration. In exchange for aggregate cash consideration totaling approximately \$15.0 million, we purchased approximately \$25.9 million in aggregate principal amount of Third Lien Notes. We also paid in cash accrued and unpaid interest on Third Lien Notes accepted for purchase in the Exchange Offer from the applicable last interest payment date to, but not including, April 28, 2016.

The following table is a summary of the loss on extinguishment of debt associated with our second quarter bond exchange (in thousands):

Total debt extinguished	\$ 146,503	
Carrying amount of debt issuance cost	(2,376)	
Net carrying amount of debt	144,127	
New Second Lien Notes issued in exchange	120,569	
Cash paid	15,000	
Common stock issued	10,740	(a)
Total consideration issued in exchange	146,309	
Loss on bond exchange	\$(2,182)	
(a) 1,205,477 shares issued at \$8.91 per share.		

Key Financial Metrics

Our results of operations have been materially affected by the impairments, restructuring charges and by other charges, which affect the comparability of certain of the financial information contained in this Form 10-K. In order to assist with the comparability to our historical results of operations, certain of the financial metrics tables and the discussion below exclude charges related to impairments, the restructuring and other write-downs. The gross profit (loss), income (loss) from operations, costs and expenses below that are identified as “As Adjusted” reflect the exclusion of the restructuring and other charges shown and described in the tables below. We believe that the non-GAAP presentation of results of operations excluding these items provides a more meaningful comparison of reporting periods.

The tables below provide (i) a summary of our net revenues for our company as a whole, and by segment, for 2016, 2015 and 2014, and (ii) an overview of other certain key financial metrics for our company as a whole and our three business segments on a comparative basis for 2016, 2015 and 2014, as reported and as adjusted in all three years for the restructuring and other charges recorded for those years.

	Years Ended December 31,		
	2016	2015	2014
	(In thousands)		
Net revenues:			
E&P Technology & Services:			
New Venture	\$27,362	\$48,294	\$98,649
Data Library	39,989	63,326	66,180
Total multi-client revenues	67,351	111,620	164,829
Imaging Services	25,538	45,630	113,075
Total	\$92,889	\$157,250	\$277,904
E&P Operations Optimization:			
Devices	\$26,746	\$36,269	\$88,417
Optimization Software & Services	16,756	27,994	39,993
Total	\$43,502	\$64,263	\$128,410
Ocean Bottom Services	\$36,417	\$—	\$103,244
Total	\$172,808	\$221,513	\$509,558

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	Year Ended December 31, 2016			Year Ended December 31, 2015			Year Ended December 31, 2014		
	As Reported	Restructuring and Other Charges	As Adjusted	As Reported	Restructuring and Other Charges	As Adjusted	As Reported	Restructuring and Other Charges	
Gross profit:									
E&P									
Technology & Services	\$4,708	\$766	\$5,474	\$13,508	\$3,193	\$16,701	\$(24,345)	\$100,825	(e)
E&P									
Operations	21,745	188	21,933	33,995	536	34,531	66,951	7,717	(f)
Optimization									
Ocean									
Bottom	9,579	123	9,702	(39,500)	252	(39,248)	19,617	—	
Services									
Total	\$36,032	\$1,077 (a)	\$37,109	\$8,003	\$3,981 (c)	\$11,984	\$62,223	\$108,542	
Gross margin:									
E&P									
Technology & Services	5	% 1	% 6	% 9	% 2	% 11	% (9)% 37	%
E&P									
Operations	50	% —	% 50	% 53	% 1	% 54	% 52	% 6	%
Optimization									
Ocean									
Bottom	26	% —	% 27	% —	% —	% —	% 19	% —	%
Services									
Total	21	% —	% 21	% 4	% 1	% 5	% 12	% 22	%
Income (loss) from operations:									
E&P									
Technology & Services	\$(16,446)	\$1,128	\$(15,318)	\$(24,941)	\$4,295	\$(20,646)	\$(80,653)	\$102,740	(e)
E&P									
Operations	9,652	197	9,849	20,131	1,790	21,921	20,201	32,715	(f)
Optimization									
Ocean									
Bottom	(1,756)	504	(1,252)	(55,080)	252	(54,828)	(4,440)	—	
Services									
Support and other	(34,621)	180	(34,441)	(40,742)	877	(39,865)	(53,037)	6,487	(g)
Total	\$(43,171)	\$2,009 (a)	\$(41,162)	\$(100,632)	\$7,214 (c)	\$(93,418)	\$(117,929)	\$141,942	
Operating margin:									
E&P									
Technology & Services	(18)% 2	% (16)% (16)% 3	% (13)% (29)% 37	%
	22	% 1	% 23	% 31	% 3	% 34	% 16	% 25	%

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E&P Operations Optimization Ocean Bottom Services	(5)% 2	% (3)% —	% —	% —	% (4)% —	%
Support and other	(20)% —	% (20)% (18)% —	% (18)% (10)% 1	%
Total	(25)% 1	% (24)% (45)% 3	% (42)% (23)% 28	%
Net income (loss) applicable to common shares	\$(65,148)	\$ (960) ^(b)	\$(66,108)	\$ (25,122)	\$ (93,587) ^(d)	\$(118,709)	\$(128,252)	\$94,143	^(h)
Diluted net income (loss) per common share ⁽¹⁾	\$(5.71)	\$ (0.09)	\$(5.80)	\$ (2.29)	\$ (8.54)	\$(10.83)	\$(11.72)	\$8.60	

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Represents
severance and
facility charges
(a) related to the
Company's 2016
restructuring.

Represents a \$3.0
million recovery
(b) of INOVA bad
debts, partially
offset by item (a).

Represents
severance and
facility charges
(c) related to the
Company's 2015
restructuring.

In addition to
item (a), also
impacting net
income (loss)
applicable to
(d) common shares
was a reduction in
the WesternGeco
legal contingency
by \$102.0
million.

Primarily relates
to the write-down
of our multi-client
data library in
2014 within the
E&P Technology
& Services
(e) segment. Also,
2014 was
impacted by the
impairment of
intangible assets
and
severance-related
charges.

(f)

Primarily relates to the write-down of goodwill, impacting income (loss) from operations, in addition to inventory write-downs, impacting gross profit (loss), and severance-related charges within the Devices group within our E&P Operations Optimization segment.

Represents the write-down of receivables from INOVA
(g) Geophysical, in addition to severance related charges.

(h) In addition to items (d), (e) and (f), also impacting net income (loss) applicable to common shares was (i) the full write-down of our equity method investment in INOVA Geophysical of \$30.7 million, in addition to our share of charges related to excess and obsolete inventory and customer bad debts of \$3.5 million, (ii) a reduction in the

WesternGeco
legal contingency
by \$69.6 million,
and (iii)
non-recurring
gains on the sale
of a cost method
investment of
\$5.5 million and
on the sale of the
Source product
line of \$6.5
million (before
tax).

We intend that the following discussion of our financial condition and results of operations will provide information that will assist in understanding our consolidated financial statements, the changes in certain key items in those financial statements from year to year, and the primary factors that accounted for those changes.

We account for our 49% interest in INOVA Geophysical as an equity method investment and recorded our share of earnings (losses) of INOVA Geophysical on a one fiscal quarter lag basis. During 2014, we wrote our investment in INOVA Geophysical down to zero, and therefore we ceased recording losses starting in 2015. For 2014, we recognized in our consolidated results of operations our share of earnings (losses) in INOVA Geophysical of approximately \$(19.5) million (excluding the write-down of our investment in INOVA).

For a discussion of factors that could impact our future operating results and financial condition, see Item 1A. “Risk Factors” above.

Results of Operations

Year Ended December 31, 2016 (As Adjusted) Compared to Year Ended December 31, 2015 (As Adjusted)

Our total net revenues of \$172.8 million for 2016 decreased \$48.7 million, or 22%, compared to total net revenues of \$221.5 million for 2015. Our overall gross profit percentage for 2016 was 21%, as adjusted, compared to a gross profit percentage of 5%, as adjusted, for 2015. Total operating expenses, as adjusted, as a percentage of net revenues for 2016 and 2015 were 45% and 48%, respectively. During 2016, our loss from operations was \$41.2 million, as adjusted, compared to a loss of \$93.4 million, as adjusted, for 2015.

Our net loss for 2016 was \$66.1 million, as adjusted, or \$(5.80) per share, compared to net loss of \$118.7 million, as adjusted, or \$(10.83) per share for 2015. As noted above, our net loss for 2016 and 2015 included restructuring charges and other (credits) totaling \$(1.0) million and \$(93.6) million, respectively, impacting our earnings per share by \$(0.09) and \$(8.54), respectively.

Net Revenues, Gross Profits and Gross Margins (As Adjusted)

E&P Technology & Services — Net revenues for 2016 decreased by \$64.4 million, or 41%, to \$92.9 million, compared to \$157.3 million for 2015. Revenues for our New Venture, Data Library and Imaging Services businesses decreased due to the continued softness in exploration spending.

Gross profit decreased by \$11.2 million to \$5.5 million, as adjusted, representing a 6% gross margin, compared to \$16.7 million, as adjusted, or an 11% gross margin, for 2015. This decrease was attributable to the significant revenue decline in our New Ventures, Data Library and Imaging Services businesses in 2016, partially offset by cost cutting measures.

E&P Operations Optimization — Devices net revenues for 2016 decreased by \$9.5 million, or 26%, to \$26.7 million, compared to \$36.3 million for 2015. This decrease in revenues was principally due to lower sales of new marine positioning products and lower marine replacement revenues on existing equipment. Optimization Software & Services net revenues for 2016 decreased by \$11.2 million, or 40%, to \$16.8 million, compared to \$28.0 million for 2015. This decrease in revenues was due to a reduction in Orca licensing revenues during 2016, due to reduced activity by seismic contractors who have taken vessels out of service. E&P Operations Optimization gross profit for 2016 decreased by \$12.6 million to \$21.9 million, as adjusted, representing a 50% gross margin, compared to \$34.5 million, as adjusted, or a 54% gross margin, for 2015. Gross profit and gross margin decreased due to the significant reduction in revenues in 2016 compared to 2015.

Ocean Bottom Services — Net revenues for 2016 were \$36.4 million representing a 27% gross margin, compared to zero revenues and gross margins for 2015. Revenues and gross margin during 2016 were favorably impacted by the completion of data acquisition for an OBS survey offshore Nigeria in the current period, compared to our idle ocean bottom vessels and crew during 2015.

Operating Expenses (As Adjusted)

The following table presents the “As Adjusted” in both 2016 and 2015, excluding special charges that resulted from both the 2016 and 2015 restructurings and other write-downs (in thousands):

	Year Ended December 31, 2016			Year Ended December 31, 2015		
	As Reported	Special Items ^(a)	As Adjusted	As Reported	Special Items ^(b)	As Adjusted
Operating expenses:						
Research, development and engineering	\$17,833	\$(397)	\$17,436	\$26,445	\$(603)	\$25,842
Marketing and sales	17,371	(262)	17,109	30,493	(304)	30,189
General, administrative and other operating expenses	43,999	(273)	43,726	51,697	(2,326)	49,371
Total operating expenses	\$79,203	\$(932)	\$78,271	\$108,635	\$(3,233)	\$105,402
Income (loss) from operations	\$(43,171)	\$2,009	\$(41,162)	\$(100,632)	\$7,214	\$(93,418)

^(a) Includes severance affecting operating expenses.

^(b) Includes severance affecting operating expenses and facility abandonment charges.

Research, Development and Engineering — Research, development and engineering expense decreased \$8.4 million, or 33%, to \$17.4 million, as adjusted, for 2016, compared to \$25.8 million, as adjusted, for 2015. During the current down-cycle in E&P exploration spending, we have been selective in spending on research and development (“R&D”) projects in order to reduce expenses without sacrificing our ability to develop our technologies. As discussed above, despite the extended market downturn and uncertainty, we see significant long-term potential for OceanGeo and our technologies to improve ocean bottom survey productivity, and we expect long-term demand for ocean bottom production surveys (4-D) to increase.

Marketing and Sales — Marketing and sales expense decreased \$13.1 million, or 43%, to \$17.1 million, as adjusted, for 2016, compared to \$30.2 million, as adjusted, for 2015. During the current down-cycle in oil and gas exploration spending, we have also reduced our payroll and marketing expenses.

General, Administrative and Other Operating Expenses — General, administrative and other operating expenses decreased \$5.7 million, or 12%, to \$43.7 million, as adjusted, for 2016 compared to \$49.4 million, as adjusted, for 2015. This decrease was primarily due to reduced payroll expenses and professional fees resulting from our cost cutting measures in order to right-size the business to current revenue levels.

Other Items

Interest Expense, net — Interest expense, net, of \$18.5 million for 2016 compared to \$18.8 million for 2015. For additional information, please refer to “— Liquidity and Capital Resources — Sources of Capital” below.

Other Income — Other income for 2016 was \$1.4 million compared to other income of \$98.3 million for 2015. The difference primarily relates to changes in our accrual for loss contingency related to a legal matter. See further discussion at Footnote 7 “Legal Matters” and in Part 1, Item 3, “Legal Proceedings.”

The following table reflects the significant items of other income (in thousands):

	Years Ended December 31,	
	2016	2015
Reduction of loss contingency related to legal proceedings (Footnote 7)	\$1,168	\$101,978
Recovery of INOVA bad debts	3,983	—
Loss on bond exchange	(2,182)	
Other expense	(1,619)	(3,703)
Total other income	\$1,350	\$98,275

Income Tax Expense — Income tax expense for 2016 was \$4.4 million compared to \$4.0 million for 2015. Our effective tax rates for 2016 and 2015 were (7.3)% and (19.2)%, respectively. Our effective tax rate for 2016 and 2015 was negatively impacted by the establishment of a valuation allowance related to our U.S. losses incurred in both years. See further discussion of establishment of the deferred tax valuation allowance at Footnote 6 “Income Taxes” of Footnotes to Consolidated Financial Statements. Our income tax expense for 2016 and 2015 relates to income from

our non-U.S. businesses. This foreign tax expense has not been offset by the tax benefits on losses within the U.S. and other jurisdictions, from which we cannot currently benefit.

Results of Operations

Year Ended December 31, 2015 (As Adjusted) Compared to Year Ended December 31, 2014 (As Adjusted)

Our total net revenues of \$221.5 million for 2015 decreased \$288.1 million, or 57%, compared to total net revenues for 2014. Our overall gross profit percentage for 2015 was 5%, as adjusted, compared to 2014's gross profit percentage of 34%, as adjusted. Total operating expenses, as adjusted, as a percentage of net revenues for 2015 and 2014 were 48% and 29%, respectively. During 2015, loss from operations of \$93.4 million, as adjusted, compared to income of \$24.0 million, as adjusted, for 2014.

Our net loss for 2015 was \$118.7 million, as adjusted, or \$(10.83) per share, compared to net loss of \$34.1 million, as adjusted, or \$(3.12) per share for 2014. As noted above, net loss for 2015 and 2014 included restructuring and other credits (charges) totaling \$93.6 million and (\$94.1) million, respectively, impacting our earnings per share by \$(8.54) and \$8.60, respectively. The per share calculations have been retroactively adjusted to reflect the one-for-fifteen reverse stock split completed on February 4, 2016.

Net Revenues, Gross Profits and Gross Margins (As Adjusted)

E&P Technology & Services — Net revenues for 2015 decreased by \$120.6 million, or 43%, to \$157.3 million, compared to \$277.9 million for 2014. Revenues for our multi-client businesses decreased due to the continued softness of exploration spending.

Gross profit decreased by \$59.8 million to \$16.7 million, as adjusted, representing a 11% gross margin, compared to \$76.5 million, as adjusted, or a 28% gross margin, for 2014. This decrease was attributable to the significant revenue decline in our multi-client and data processing businesses in 2015.

E&P Operations Optimization — Devices net revenues for 2015 decreased by \$52.1 million, or 59%, to \$36.3 million, compared to \$88.4 million for 2014. This decrease in revenues was principally due to (i) lower sales of new marine positioning products; (ii) lower marine and replacement revenues on existing equipment; and (iii) lower geophone string sales. Optimization Software & Services net revenues for 2015 decreased by \$12.0 million, or 30%, to \$28.0 million, compared to \$40.0 million for 2014. This decrease in revenues was due to record revenue quarters in the first half of 2014 followed by a reduction in Orca licensing revenues during 2015, due to reduced activity by seismic contractors that have taken vessels out of service. E&P Operations Optimization gross profit for 2015 decreased by \$40.2 million to \$34.5 million, as adjusted, representing a 54% gross margin, compared to \$74.7 million, as adjusted, or a 58% gross margin, for 2014. Gross profit and gross margin decreased due to the significant reduction in revenues in 2015 compared to 2014.

Ocean Bottom Services — There were no net revenues or gross margin for 2015, compared to net revenues of \$103.2 million and gross margins of 19% for 2014, due to OceanGeo's crew being idle during 2015. In addition, as part of the current segment realignment in 2015, \$5.2 million of costs to manufacture ocean bottom equipment that were previously recorded in E&P Operations Optimization segment within our Devices group is now included in Ocean Bottom Services segment as compared to \$8.3 million of costs in 2014.

Operating Expenses (As Adjusted)

The following table presents the "As Adjusted" in both 2015 and 2014, excluding special charges that resulted from both the 2015 and 2014 restructurings and other write-downs (in thousands):

	Year Ended December 31, 2015			Year Ended December 31, 2014		
	As Reported	Special Items ^(a)	As Adjusted	As Reported	Special Items ^(b)	As Adjusted
Operating expenses:						
Research, development and engineering	\$26,445	\$(603)	\$25,842	\$41,009	\$(572)	\$40,437
Marketing and sales	30,493	(304)	30,189	39,682	(326)	39,356
General, administrative and other operating expenses	51,697	(2,326)	49,371	76,177	(9,218)	66,959
Impairment of goodwill and intangible assets	—	—	—	23,284	(23,284)	—
Total operating expenses	\$108,635	\$(3,233)	\$105,402	\$180,152	\$(33,400)	\$146,752
Income (loss) from operations	\$(100,632)	\$7,214	\$(93,418)	\$(117,929)	\$141,942	\$24,013

^(a) Includes severance affecting operating expenses and facility abandonment charges.

Includes (i) the write-down of goodwill related to our Devices reporting unit, (ii) the write-down of intangible

^(b) assets, (iii) the write-down of receivables related to INOVA Geophysical and other customer bad debt, and (iv) severance charges affecting operating expense lines.

Research, Development and Engineering — Research, development and engineering expense decreased \$14.6 million, or 36%, to \$25.8 million, as adjusted, for 2015, compared to \$40.4 million, as adjusted, for 2014. This decrease was primarily due to cost cutting measures in order to right-size the business to current revenue levels.

Marketing and Sales — Marketing and sales expense decreased \$9.2 million, or 23%, to \$30.2 million, as adjusted, for 2015, compared to \$39.4 million, as adjusted, for 2014. This decrease was primarily due to cost cutting measures in order to right-size the business to current revenue levels.

General, Administrative and Other Operating Expenses — General, administrative and other operating expenses decreased \$17.6 million, or 23%, to \$49.4 million, as adjusted, for 2015 compared to \$67.0 million, as adjusted, for 2014. This decrease was primarily due to cost cutting measures in order to right-size the business to current revenue levels.

Other Items

Interest Expense, net — Interest expense, net, of \$18.8 million for 2015 decreased compared to \$19.4 million for 2014. For additional information, please refer to “— Liquidity and Capital Resources — Sources of Capital” below.

Equity in Losses of Investments — We account for our investment in INOVA Geophysical as an equity method investment.

We recorded our share of earnings and losses of our 49% interest in INOVA Geophysical on a one fiscal quarter lag basis. On December 31, 2014 we wrote down our investment in INOVA Geophysical to zero, therefore we ceased recording losses in 2015.

Other Income — Other income for 2015 was \$98.3 million compared to other income of \$79.9 million for 2014. The difference primarily relates to changes in our accrual for loss contingency related to a legal matter. See further discussion at Footnote 7 “Legal Matters” and in Part 1, Item 3, “Legal Proceedings.”

The following table reflects the significant items of other income (in thousands):

	Years Ended	
	December 31, 2015	2014
Reduction of loss contingency related to legal proceedings (Footnote 7)	\$101,978	\$69,557
Gain on sale of a product line ⁽¹⁾	—	6,522
Gain on sale of a cost method investment ⁽²⁾	—	5,463
Other expense	(3,703)	(1,682)
Total other income	\$98,275	\$79,860

In 2014, we sold our Source product line for approximately \$14.4 million, net of transaction fees, recording a gain

⁽¹⁾ of approximately \$6.5 million before taxes. The historical results of this product line have not been material to our results of operations.

⁽²⁾

Includes the 2014 sale of our cost method investment in a privately-owned U.S.-based technology company for total proceeds of approximately \$16.5 million, of which \$14.1 million was due and paid at closing.

Income Tax Expense — Income tax expense for 2015 was \$4.0 million compared to \$20.6 million for 2014. Our effective tax rates for 2015 and 2014 were (19.2)% and (19.2)%, respectively. Our effective tax rate for 2015 was negatively impacted by the establishment of a valuation allowance related to our U.S. losses incurred in 2015. See further discussion of establishment of the deferred tax valuation allowance at Footnote 6 “Income Taxes” of Footnotes to Consolidated Financial Statements. Our income tax expense for 2015 relates to income from our non-U.S. businesses. This foreign tax expense has not been offset by the tax benefits on losses within the U.S. and other jurisdictions, from which we cannot currently benefit.

Liquidity and Capital Resources

Sources of Capital

As of December 31, 2016, we had \$52.7 million in cash on hand and \$15.2 million of undrawn borrowing base availability under the Credit Facility. Our cash requirements include working capital requirements and cash required for our debt service payments, multi-client seismic data acquisition activities and capital expenditures. As of December 31, 2016, we had working capital of \$16.6 million. Working capital requirements are primarily driven by our investment in our (i) multi-client data library (\$14.9 million in the Current Period) and, (ii) working capital requirements on our OBS survey in our Ocean Bottom Services segment, and (iii) our inventory purchase obligations. Also, our headcount has traditionally been a significant driver of our working capital needs. Because a significant portion of our business is involved in the planning, processing and interpretation of seismic data services, one of our largest investments is in our employees, which involves cash expenditures for their salaries, bonuses, payroll taxes and related compensation expenses. As previously noted, during late 2014 and 2015, we reduced our workforce by over 50%, and reduced salaries by 10% for a majority of our employees and closed selected facilities. These actions resulted in annualized cash savings of approximately \$80.0 million which we began to fully benefit in late 2015. In April 2016, we implemented additional cost saving initiatives by reducing our current workforce by approximately an additional 12%. These further reductions resulted in approximately \$15.0 million of additional annualized savings, which we began to realize the full savings in the fourth quarter 2016.

Our working capital requirements may change from time to time depending upon many factors, including our operating results and adjustments in our operating plan in response to industry conditions, competition and unexpected events. In recent years, our primary sources of funds have been cash flows generated from operations, existing cash balances, debt and equity issuances and borrowings under our revolving credit facilities.

ATM Program — On December 22, 2016, we announced that we had filed a prospectus supplement under which we may sell up to \$20.0 million of our common stock through an ATM Program. We intend to use the net proceeds from sales under the ATM Program for general corporate purposes. The timing of any sales will depend on a variety of factors to be determined by us. As of December 31, 2016, no shares were sold under the program.

Credit Facility, including Revolving Line of Credit

In August 2014, we and our material U.S. subsidiaries, GX Technology Corporation, ION Exploration Products (U.S.A.), Inc. and I/O Marine Systems, Inc. (collectively, the “Subsidiary Borrowers”) entered into a Revolving Credit and Security Agreement with PNC Bank, National Association (“PNC”), as agent (the “Original Credit Agreement”), which was amended by the First Amendment to Revolving Credit and Security Agreement in August 2015 (the “First Amendment”) and the Second Amendment to Revolving Credit and Security Agreement in April 2016 (the “Second Amendment”; the Original Credit Agreement, as amended by the First Amendment and the Second Amendment, the “Credit Facility”).

The Credit Facility is available to provide for the Borrowers’ general corporate needs, including working capital requirements, capital expenditures, surety deposits and acquisition financing. The maximum amount of the revolving line of credit under the Credit Facility is the lesser of \$40.0 million and a monthly borrowing base (which may be recalculated more frequently under certain circumstances).

The borrowing base under the Credit Facility will increase or decrease monthly using a formula based on certain eligible receivables, eligible inventory and other amounts, including a percentage of the net orderly liquidation value of our multi-client data library (not to exceed \$15.0 million for the multi-client data library data component). As of December 31, 2016, the borrowing base under the Credit Facility was \$25.2 million, and there was \$10.0 million of outstanding indebtedness under the Credit Facility.

The Credit Facility requires us to maintain compliance with various covenants. At December 31, 2016, we were in compliance with all of the covenants under the Credit Facility. For further information regarding our Credit Facility see Footnote 4 “Long-term Debt and Lease Obligations” of Footnotes to Consolidated Financial Statements.
Senior Secured Notes

In May 2013, we sold \$175.0 million aggregate principal amount of 8.125% Senior Secured Second-Priority Notes due 2018 (the “Third Lien Notes”) in a private offering pursuant to an indenture dated as of May 13, 2013 (the “Third Lien Notes Indenture”). Prior to the completion of the Exchange Offer and Consent Solicitation on April 28, 2016, the Third Lien Notes were our senior secured second-priority obligations. After giving effect to the Exchange Offer and Consent Solicitation, the remaining aggregate principal amount of approximately \$28.5 million of outstanding Third Lien Notes became our senior secured third-priority obligations subordinated to the liens securing all of our senior and second priority indebtedness, including under the Credit Facility and Second Lien Notes.

Pursuant to the Exchange Offer and Consent Solicitation, we (i) issued approximately \$120.6 million in aggregate principal amount of our new Second Lien Notes and 1,205,477 shares of common stock, (utilizing 508,464 of treasury shares) in exchange for approximately \$120.6 million in aggregate principal amount of Third Lien Notes, and (ii) purchased approximately \$25.9 million in aggregate principal amount of Third Lien Notes in exchange for aggregate cash consideration totaling approximately \$15 million, plus accrued and unpaid interest on the Third Lien Notes from the applicable last interest payment date to, but not including, April 28, 2016.

After giving effect to the Exchange Offer and Consent Solicitation, the aggregate principal amount of the Third Lien Notes remaining outstanding was approximately \$28.5 million and the aggregate principal amount of Second Lien Notes outstanding was approximately \$120.6 million.

The Third Lien Notes are guaranteed by our material U.S. subsidiaries, GX Technology Corporation, ION Exploration Products (U.S.A.), Inc. and I/O Marine Systems, Inc. (the “Guarantors”). The Third Lien Notes mature on May 15, 2018. Interest on the Third Lien Notes accrues at the rate of 8.125% per annum and is payable semiannually in arrears on May 15 and November 15 of each year during their term. In May 2014, the holders of the Third Lien Notes exchanged their Third Lien Notes for a like principal amount of registered Third Lien Notes with the same terms. On or after May 15, 2015, we may on one or more occasions redeem all or a part of the Third Lien Notes at the redemption prices set forth below, plus accrued and unpaid interest and special interest, if any, on the Third Lien Notes redeemed during the twelve-month period beginning on May 15th of the years indicated below:

Date	Percentage
2015	104.063%
2016	102.031%
2017 and thereafter	100.000%

The Third Lien Notes Indenture requires us to maintain compliance with various covenants. At December 31, 2016, we were in compliance with all of the covenants under the Third Lien Notes Indenture. For further information regarding the Third Lien Notes, see Footnote 4 “Long-term Debt and Lease Obligations” of Footnotes to Consolidated Financial Statements.

The Second Lien Notes are senior secured second-priority obligations guaranteed by the Guarantors. The Second Lien Notes mature on December 15, 2021. Interest on the Second Lien Notes accrues at the rate of 9.125% per annum and is payable semiannually in arrears on June 15 and December 15 of each year during their term, beginning June 15, 2016, except that the interest payment otherwise payable on June 15, 2021 will be payable on December 15, 2021. The indenture dated April 28, 2016 governing the Second Lien Notes (the “Second Lien Notes Indenture”) contains certain covenants that, among other things, limits or prohibits our ability and the ability of our restricted subsidiaries to take certain actions or permit certain conditions to exist during the term of the Second Lien Notes, including among other things, incurring additional indebtedness, creating liens, paying dividends and making other distributions in respect of our capital stock, redeeming our capital stock, making investments or certain other restricted payments, selling certain kinds of assets, entering into transactions with affiliates, and effecting mergers or consolidations. These and other restrictive covenants contained in the Second Lien Notes Indenture are subject to certain exceptions and qualifications. At December 31, 2016, we were in compliance with all of the covenants under the Second Lien Notes Indenture. All of our subsidiaries are currently restricted subsidiaries.

On or after December 15, 2019, we may on one or more occasions redeem all or a part of the Second Lien Notes at the redemption prices set forth below, plus accrued and unpaid interest and special interest, if any, on the Second Lien Notes redeemed during the twelve-month period beginning on December 15th of the years indicated below:

Date	Percentage
2019	105.500%
2020	103.500%
2021 and thereafter	100.000%

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Meeting our Liquidity Requirements

As of December 31, 2016, our total outstanding indebtedness (including capital lease obligations) was approximately \$158.8 million, consisting primarily of approximately \$28.5 million outstanding Notes (maturing in May 2018), \$120.6 million outstanding Notes (maturing in December 2021) and \$3.4 million of capital leases. As of December 31, 2016, there was \$10.0 million of outstanding indebtedness under our Credit Facility.

In late April, we completed our Exchange Offer, retiring approximately \$25.9 million of our \$175.0 million Third Lien Notes, using approximately \$15.0 million of our cash before fees. We believe that the consummation of the Exchange Offer will ultimately improve our liquidity position and give us more flexibility in how we invest cash into our businesses. See “Executive Summary – Macroeconomic Conditions” above.

For 2016, total capital expenditures, including investments in our multi-client data library, were \$16.4 million. We currently expect that our capital expenditures, including investments in our multi-client data library, will be a range of \$20.0 million to \$35.0 million in 2017. Investments in our multi-client data library are dependent upon the timing of our new ventures projects and the availability of underwriting by our customers.

We currently believe that our existing cash, cash generated from operations, our sources of working capital, and our Credit Facility will be sufficient for us to meet our anticipated cash needs for the foreseeable future.

Loss Contingency — WesternGeco Lawsuit

On November 14, 2016, the District Court ordered that payment of the royalty damages be made immediately pending further proceeding at the District Court to determine whether additional enhanced damages related to willfulness may be awarded or not. In accordance with the District Court’s order, we paid \$20.8 million to WesternGeco on November 25, 2016. After this payment, the remaining \$1.1 million accrual was reversed to zero. The District Court previously refused WesternGeco’s request for additional damages for willfulness, but a change in the law in June 2016, permitted WesternGeco to renew its request, we have opposed WesternGeco’s motion. WesternGeco has also filed a motion in the U.S. Supreme Court indicating it intends to appeal the lost profits again. We will oppose WesternGeco’s second attempt to appeal to the Supreme Court matters it did not succeed on in its appeal last year (among other reasons). As described at Part I, Item 3. “Legal Proceedings,” there are possible scenarios involving an adverse judgment at the trial court on additional damages for willfulness in the WesternGeco lawsuit that could materially and adversely affect our liquidity. In connection with our appeal of the original District Court judgment, we arranged with sureties to post an appeal bond on our behalf. The terms of the appeal bond arrangements provide the sureties the contractual right for as long as the bond is outstanding to require us to post cash collateral for up to the full amount of the bond. We previously received a request for \$11.0 million in collateral which was renewed in July of 2016. In light of the payment of the \$20.8 million in royalty damages by us, the sureties filed motions on December 30, 2016 to have the appeal bond dismissed. If the bonds are not dismissed, any requirements that we collateralize the appeal bond will reduce our liquidity and may reduce the amount otherwise available to be borrowed under our Credit Facility. If we are required to collateralize the bond or obtain a new bond, we might also seek additional debt and/or equity financing. No assurances can be made whether our efforts to raise additional cash would be successful and, if so, on what terms and conditions, and at what cost we might be able to secure any such financing. If additional funds are raised through the issuance of debt and/or equity securities, these securities could have rights, preferences and privileges less favorable to us than our current debt or equity securities, and the terms of these securities could impose further restrictions on our operations. If we are unable to raise additional capital under these circumstances or if additional damages are awarded, it would likely have a material adverse effect on our company and impact our ability to execute our business plan.

Additional damages may be awarded as part of the new proceedings before the District Court and we could be required to pay damages up to approximately an additional \$44.0 million, subject to appeal. Our assessment of whether or not any loss contingency is needed may change in the future due to developments at the District Court and other events, such as changes in applicable law or an adverse order, and such reassessment could lead to the determination that a new loss contingency should be established pending appeal, which could have a material effect on our business, financial condition and results of operations. The reversal of the loss accrual and related matters disclosed in this Annual Report on Form 10-K or elsewhere are based on currently available information and involve

elements of judgment and significant uncertainties.

Cash Flow from Operations

Net cash provided by operating activities was \$1.6 million for 2016, compared to net cash used in operating activities of \$16.5 million for 2015. The increase in our cash flows from operations was primarily due to reduced spend due to our cost reduction initiatives and accounts receivable collections offset by a \$20.8 million damages payment for the WesternGeco lawsuit.

Net cash used in operating activities was \$16.5 million for 2015, compared to net cash provided by operating activities of \$129.8 million for 2014. The decrease in our cash flows from operations was primarily due to lower revenues in 2015 compared to 2014, from the slowdown in exploration spending as well as decreases in accounts payable accrued expenses and accrued royalties.

Cash Flow Used In Investing Activities

Net cash flow used in investing activities was \$13.6 million for 2016, compared to \$63.5 million for 2015. The principal uses of cash in our investing activities during 2016 were \$14.9 million of investments in our multi-client data library and \$1.5 million of investments in property, plant and equipment, partially offset by proceeds from the escrow related to the sale of a cost method investment in 2014.

Net cash flow used in investing activities was \$63.5 million for 2015, compared to \$48.8 million for 2014. The principal uses of cash in our investing activities during 2015 were \$45.6 million of investments in our multi-client data library and \$19.2 million of investments in property, plant and equipment.

Cash Flow from Financing Activities

Net cash flow used in financing activities was \$21.6 million for 2016, compared to \$9.5 million of net cash flow used in financing activities for 2015. The net cash flow used in financing activities during 2016 was primarily related to \$15 million to repurchase bonds, \$8.7 million of payments on long-term debt related to equipment capital leases, \$6.6 million of debt issuance costs and \$1.0 million to repurchase of common stock. In addition, we had net borrowings of \$10.0 million on our revolving line of credit.

Net cash flow used in financing activities was \$9.5 million for 2015, compared to \$56.0 million of net cash flow provided by financing activities for 2014. The net cash flow used in financing activities during 2015 was primarily related to \$7.5 million of payments on long-term debt related to equipment capital leases and \$2.0 million to repurchase of common stock.

Inflation and Seasonality

Inflation in recent years has not had a material effect on our costs of goods or labor, or the prices for our products or services. Traditionally, our business has been seasonal, with strongest demand typically in the fourth quarter of our fiscal year. However, sales in 2016 have been negatively impacted by reduced exploration spending by our E&P customers.

Future Contractual Obligations

The following table sets forth estimates of future payments of our consolidated contractual obligations, as of December 31, 2016 (in thousands):

Contractual Obligations	Total	Less Than 1 Year	1-3 Years	3-5 Years	More Than 5 Years
Long-term debt	\$149,066	\$ —	\$ 28,497	\$ 120,569	\$ —
Interest on long-term debt obligations	59,693	13,609	34,854	11,230	—
Revolver credit facility	10,000	10,000	—	—	—
Equipment capital lease obligations	3,446	3,166	280	—	—
Operating leases	78,118	10,947	29,164	29,860	8,147
Purchase obligations	1,197	1,197	—	—	—
Total	\$301,520	\$ 38,919	\$ 92,795	\$ 161,659	\$ 8,147

The long-term debt at December 31, 2016 included \$28.5 million and \$120.6 million of principal indebtedness outstanding under our Notes issued in May 2013 and April 2016, respectively. The \$3.4 million of equipment capital lease obligations relates to Imaging Services' financing of computer and other equipment purchases.

The operating lease commitments at December 31, 2016 relate to our leases for certain equipment, offices, processing centers, warehouse space and seismic vessels under non-cancelable operating leases. On our existing OceanGeo vessel leases, our future commitments are di minimis if we do not re-charter the vessels for a future data survey. Our purchase obligations primarily relate to our committed inventory purchase orders under which deliveries of inventory are scheduled to be made in 2017.

Critical Accounting Policies and Estimates

The preparation of consolidated financial statements in conformity with generally accepted accounting principles in the United States requires management to make choices between acceptable methods of accounting and to use judgment in making estimates and assumptions that affect the reported amounts of assets and liabilities, disclosure of contingent assets and liabilities, and the reported amounts of revenue and expenses. The following accounting policies are based on, among other things, judgments and assumptions made by management that include inherent risk and uncertainties. Management's estimates are based on the relevant information available at the end of each period. We believe that all of the judgments and estimates used to prepare our financial statements were reasonable at the time we made them, but circumstances may change requiring us to revise our estimates in ways that could be materially adverse to our results of operations and financial condition. We describe our significant accounting policies more fully in Footnote 1 "Summary of Significant Accounting Policies" of Footnotes to Consolidated Financial Statements.

Revenue Recognition

We derive revenue from the sale of (i) multi-client and proprietary surveys, licenses of "on-the-shelf" data libraries and imaging services, within our E&P Technologies & Services segment; (ii) seismic data acquisition systems and other seismic equipment, (iii) seismic command and control software systems and software solutions for operations management within our E&P Operations Optimization segment; and (iv) fully-integrated OBS solutions that include survey design and planning and data acquisition within our Ocean Bottom Services segment. All revenues of the E&P Technology & Services and Ocean Bottom Services segments and the services component of revenues for the Optimization Software & Services group as part of the E&P Operations Optimization segment are classified as services revenues. All other revenues are classified as product revenues.

Multi-Client and Proprietary Surveys, Data Libraries and Imaging Services — As our multi-client surveys are being designed, acquired or processed (referred to as the "new venture" phase), we enter into non-exclusive licensing arrangements with our customers. License revenues from these new venture survey projects are recognized during the new venture phase as the seismic data is acquired and/or processed on a proportionate basis as work is performed. Under this method, we recognize revenues based upon quantifiable measures of progress, such as kilometers acquired or days processed. Upon completion of a multi-client seismic survey, the seismic survey is considered "on-the-shelf," and licenses to the survey data are granted to customers on a non-exclusive basis. Revenues on licenses of completed multi-client data surveys are recognized when (a) a signed final master geophysical data license agreement and accompanying supplemental license agreement are returned by the customer; (b) the purchase price for the license is fixed or determinable; (c) delivery or performance has occurred; and (d) no significant uncertainty exists as to the customer's obligation, willingness or ability to pay. In limited situations, we have provided the customer with a right to exchange seismic data for another specific seismic data set. In these limited situations, we recognize revenue at the earlier of the customer exercising its exchange right or the expiration of the customer's exchange right.

We also perform seismic surveys under contracts to specific customers, whereby the seismic data is owned by those customers. We recognize revenue as the seismic data is acquired and/or processed on a proportionate basis as work is performed. We use quantifiable measures of progress consistent with our multi-client surveys.

Revenues from all imaging and other services are recognized when persuasive evidence of an arrangement exists, the price is fixed or determinable, and collectibility is reasonably assured. Revenues from contract services performed on a dayrate basis are recognized as the service is performed.

Acquisition Systems and Other Seismic Equipment — For the sales of seismic data acquisition systems and other seismic equipment, we follow the requirements of ASC 605-10 "Revenue Recognition" and recognize revenue when (a) evidence of an arrangement exists; (b) the price to the customer is fixed and determinable; (c) collectibility is reasonably assured; and (d) the acquisition system or other seismic equipment is delivered to the customer and risk of ownership has passed to the customer, or, in the case in which a substantive customer-specified acceptance clause exists in the contract, the later of delivery or when the customer-specified acceptance is obtained

Software — For the sales of navigation, survey and quality control software systems, we follow the requirements for these transactions of ASC 985-605 "Software Revenue Recognition" ("ASC 985-605"). We recognize revenue from sales of these software systems when (a) evidence of an arrangement exists; (b) the price to the customer is fixed and determinable; (c) collectibility is reasonably assured; and (d) the software is delivered to the customer and risk of

ownership has passed to the customer, or, in the limited case in which a substantive customer-specified acceptance clause exists, the later of delivery or when the customer-specified acceptance is obtained. These arrangements generally include us providing related services, such as training courses, engineering services and annual software maintenance. We allocate revenue to each element of the arrangement based upon vendor-specific objective evidence (“VSOE”) of fair value of the element or, if VSOE is not available for the delivered element, we apply the residual method.

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In addition to perpetual software licenses, we offer time-based software licenses. For time-based licenses, we recognize revenue ratably over the contract term, which is generally two to five years.

Ocean Bottom Services — We recognize revenues as they are realized and earned and can be reasonably measured, based on contractual dayrates or on a fixed-price basis, and when collectability is reasonably assured. In connection with acquisition contracts, we may receive revenues for preparation and mobilization of equipment and personnel or for capital improvements to vessels. We defer the revenues earned and incremental costs incurred that are directly related to contract preparation and mobilization and recognize such revenues and costs over the primary contract term of the acquisition project. We use the ratio of square kilometers acquired as a percentage of the total square kilometers expected to be acquired over the primary term of the contract to recognize deferred revenues and amortize, in cost of services, the costs related to contract preparation and mobilization. We recognize the costs of relocating vessels without contracts to more promising market sectors as such costs are incurred. Upon completion of acquisition contracts, we recognize in earnings any demobilization fees received and expenses incurred.

Multiple-element Arrangements — When separate elements (such as an acquisition system, other seismic equipment and/or imaging and acquisition services) are contained in a single sales arrangement, or in related arrangements with the same customer, we follow the requirements of ASC 605-25 “Accounting for Multiple-Element Revenue Arrangement” (“ASC 605-25”).

This guidance requires that arrangement consideration be allocated at the inception of an arrangement to all deliverables using the relative selling price method. We allocate arrangement consideration to each deliverable qualifying as a separate unit of accounting in an arrangement based on its relative selling price. We determine selling price using VSOE, if it exists, and otherwise, third-party evidence (“TPE”). If neither VSOE nor TPE of selling price exists for a unit of accounting, we use estimated selling price (“ESP”). We generally expect that we will not be able to establish TPE due to the nature of the markets in which we compete, and, as such, we typically will determine selling price using VSOE or if not available, ESP. VSOE is generally limited to the price charged when the same or similar product is sold on a standalone basis. If a product is seldom sold on a standalone basis, it is unlikely that we can determine VSOE for the product.

The objective of ESP is to determine the price at which we would transact if the product were sold by us on a standalone basis. Our determination of ESP involves a weighting of several factors based on the specific facts and circumstances of the arrangement. Specifically, we consider the anticipated margin on the particular deliverable, the selling price and profit margin for similar products and our ongoing pricing strategy and policies.

Multi-Client Data Library

Our multi-client data library consists of seismic surveys that are offered for licensing to customers on a non-exclusive basis. The capitalized costs include the costs paid to third parties for the acquisition of data and related activities associated with the data creation activity and direct internal processing costs, such as salaries, benefits, computer-related expenses and other costs incurred for seismic data project design and management. For 2016, 2015 and 2014, we capitalized, as part of our multi-client data library, \$6.6 million, \$6.1 million and \$8.3 million, respectively, of direct internal processing costs.

Our method of amortizing the costs of an in-process multi-client data library (the period during which the seismic data is being acquired or processed, referred to as the “new venture” phase) consists of determining the percentage of actual revenue recognized to the total estimated revenues (which includes both revenues estimated to be realized during the new venture phase and estimated revenues from the licensing of the resulting “on-the-shelf” data survey) and multiplying that percentage by the total cost of the project (the sales forecast method). We consider a multi-client data survey to be complete when all work on the creation of the seismic data is finished and that data survey is available for licensing.

Once a multi-client data survey is completed, the data survey is considered “on-the-shelf” and our method of amortization is then the greater of (i) the sales forecast method or (ii) the straight-line basis over a four-year period. The greater amount of amortization resulting from the sales forecast method or the straight-line amortization policy is applied on a cumulative basis at the individual survey level. Under this policy, we first record amortization using the sales forecast method. The cumulative amortization recorded for each survey is then compared with the cumulative straight-line amortization. The four-year period utilized in this cumulative comparison commences when the data

survey is determined to be complete. If the cumulative straight-line amortization is higher for any specific survey, additional amortization expense is recorded, resulting in the accumulated amortization being equal to the cumulative straight-line amortization for that survey. We have determined the amortization period to be four years based upon our historical experience that indicates that the majority of our revenues from multi-client surveys are derived during the acquisition and processing phases and during the four years subsequent to survey completion.

Estimated sales are determined based upon discussions with our customers, our experience and our knowledge of industry trends. Changes in sales estimates may have the effect of changing the percentage relationship of cost of services to revenue. In applying the sales forecast method, an increase in the projected sales of a survey will result in lower cost of services as a percentage of revenue and higher earnings when revenue associated with that particular survey is recognized, while a decrease in projected sales will have the opposite effect. Assuming that the overall volume of sales mix of surveys generating revenue in the period was held constant in 2016, an increase of 10% in the sales forecasts of all surveys would have increased our amortization expense by approximately \$0.8 million.

We estimate the ultimate revenue expected to be derived from a particular seismic data survey over its estimated useful economic life to determine the costs to amortize, if greater than straight-line amortization. That estimate is made by us at the project's initiation. For a completed multi-client survey, we review the estimate quarterly. If during any such review, we determine that the ultimate revenue for a survey is expected to be materially more or less than the original estimate of total revenue for such survey, we decrease or increase (as the case may be) the amortization rate attributable to the future revenue from such survey. In addition, in connection with such reviews, we evaluate the recoverability of the multi-client data library, and if required under ASC 360-10 "Impairment and Disposal of Long-Lived Assets," record an impairment charge with respect to such data. In 2014, we wrote down our multi-client data library by \$100.1 million due to current market conditions. For a full discussion of impairments of our multi-client data library in 2014, see Footnote 2 "Cost Reduction Initiative, Impairments, Restructurings and Other Charges" of Footnotes to Consolidated Financial Statements included elsewhere in this Form 10-K for additional information. There were no significant impairment charges during 2016.

Reserve for Excess and Obsolete Inventories

Our reserve for excess and obsolete inventories is based on historical sales trends and various other assumptions and judgments, including future demand for our inventory, the timing of market acceptance of our new products and the risk of obsolescence driven by new product introductions. When we record a charge for excess and obsolete inventories, the amount is applied as a reduction in the cost basis of the specific inventory item for which the charge was recorded. Should these assumptions and judgments not be realized for these or for other reasons, our reserve would be adjusted to reflect actual results. Our industry is subject to technological change and new product development that could result in obsolete inventory. Our reserve for inventory at December 31, 2016 was \$15.0 million compared to \$24.5 million at December 31, 2015.

Goodwill and Other Intangible Assets

Goodwill is allocated to our reporting units, which is either the operating segment or one reporting level below the operating segment. For purposes of performing the impairment test for goodwill as required by ASC 350 "Intangibles — Goodwill and Other" ("ASC 350"), we established the following reporting units: E&P Technology & Services, (formerly Solutions), Optimization Software & Services, (formerly Software), Devices (formerly Marine Systems), and Ocean Bottom Services. To determine the fair value of our reporting units, we use a discounted future returns valuation method. If we had established different reporting units or utilized different valuation methodologies, our impairment test results could differ. Additionally, we compared the sum of the estimated fair values of the individual reporting units less consolidated debt to our overall market capitalization as reflected by our stock price.

In accordance with ASC 350, we are required to evaluate the carrying value of our goodwill at least annually for impairment, or more frequently if facts and circumstances indicate that it is more likely than not impairment has occurred. We formally evaluate the carrying value of our goodwill for impairment as of December 31 for each of our reporting units. We first perform a qualitative assessment by evaluating relevant events or circumstances to determine whether it is more likely than not that the fair value of a reporting unit is less than its carrying amount. If we are unable to conclude qualitatively that it is more likely than not that a reporting unit's fair value exceeds its carrying value, then we will use a two-step quantitative assessment of the fair value of a reporting unit. If the carrying value of a reporting unit of an entity that includes goodwill is determined to be more than the fair value of the reporting unit, there exists the possibility of impairment of goodwill. An impairment loss of goodwill is measured in two steps by first allocating the fair value of the reporting unit to net assets and liabilities including recorded and unrecorded other intangible assets to determine the implied carrying value of goodwill. The next step is to measure the difference between the carrying value of goodwill and the implied carrying value of goodwill, and, if the implied carrying value

of goodwill is less than the carrying value of goodwill, an impairment loss is recorded equal to the difference. We completed our annual goodwill impairment testing as of December 31, 2016 and concluded no impairment was required. The goodwill balance as of December 31, 2016 was comprised of \$19.3 million in our Optimization Software & Services and \$2.9 million in our E&P Technology & Services reporting units. There were no impairment charges recorded in 2016.

Based on our qualitative assessment performed as of December 31, 2016 we concluded it was more likely than not that the fair values of our E&P Technology & Services, and Optimization Software & Services reporting units exceeded their carrying values. However, if the market value of our shares declines for a prolonged period, and if management's judgments and assumptions regarding future industry conditions and operations diminish, it is reasonably possible that our expectations of future cash flows may decline and ultimately result in a goodwill impairment for our E&P Technology & Services, and Optimization Software & Services reporting units.

Our intangible assets, other than goodwill, relate to our customer relationships. We amortize our customer relationship intangible assets on an accelerated basis over a 10- to 15-year period, using the undiscounted cash flows of the initial valuation models. We use an accelerated basis as these intangible assets were initially valued using an income approach, with an attrition rate that resulted in a pattern of declining cash flows over a 10- to 15-year period.

Following the guidance of ASC 360 "Property, Plant and Equipment," we review the carrying values of these intangible assets for impairment if events or changes in the facts and circumstances indicate that it is more likely than not their carrying value may not be recoverable. Any impairment determined is recorded in the current period and is measured by comparing the fair value of the related asset to its carrying value.

Similar to our treatment of goodwill, in making these assessments, we rely on a number of factors, including operating results, business plans, internal and external economic projections, anticipated future cash flows and external market data. However, if our estimates or related projections associated with the reporting units significantly change in the future, we may be required to record further impairment charges.

Deferred Tax Assets

During 2013 we established a valuation allowance on a substantial majority of our U.S. net deferred tax assets due to the large one time charges taken during the year. The valuation allowance was calculated in accordance with the provisions of ASC 740-10, "Accounting for Income Taxes," which requires that a valuation allowance be established or maintained when it is "more likely than not" that all or a portion of deferred tax assets will not be realized. We will continue to record a valuation allowance for the substantial majority of all of our deferred tax assets until there is sufficient evidence to warrant reversal. In the event our expectations of future operating results change, an additional valuation allowance may be required to be established on our existing unreserved net U.S. deferred tax assets.

Foreign Sales Risks

For 2016, we recognized \$41.7 million of sales to customers in Latin American countries, \$16.2 million of sales to customers in Europe, \$24.1 million of sales to customers in Asia Pacific, \$9.5 million of sales to customers in Africa, \$41.4 million of sales to customers in the Middle East and \$1.9 million of sales to customers in the Commonwealth of Independent States, or former Soviet Union (CIS). The majority of our foreign sales are denominated in U.S. dollars. For 2016, 2015 and 2014, international sales comprised 78%, 66% and 74%, respectively, of total net revenues. The significant decline in oil price that began in the fourth quarter of 2014 have continued to impact the global market throughout 2015 and 2016. The deal reached by OPEC in late 2016 promises to remove approximately 1.2 million bpd from global oil production with an additional .6 million bpd of cuts coming from non-OPEC participants such as Russia. The decline in crude oil prices, as well as U.S. and European Union sanctions against Russia related to its actions in Ukraine, have both contributed to the devaluation of the Russian Ruble putting significant pressure on our Russian-based customers and negatively impacting the appeal of seismic data located in Russia to potential non-Russian buyers. The Russian Ruble declined sharply throughout 2015 and into January 2016, reaching its lowest level since the currency was redenominated in 1998, before partially recovering during 2016. Our results of operations, liquidity and financial condition related to our operations in Russia are primarily denominated in U.S. dollars. In addition, the British Pound Sterling experienced significant devaluation beginning in mid-2016 following the vote by the British people to leave the European Union Brexit impacting our GBP-denominated balances. To the extent that world events or economic conditions negatively affect our future sales to customers in many regions of the world, as well as the collectability of our existing receivables, our future results of operations, liquidity and financial condition would be adversely affected.

Off-Balance Sheet Arrangements

Variable interest entities. As of December 31, 2016, our investment in INOVA Geophysical constitutes an investment in a variable interest entity, as that term is defined in FASB ASC Topic 810-10 "Consolidation – Overall" and as defined

in Item 303(a)(4)(ii) of SEC Regulation S-K. See Footnote 1 “Summary of Significant Accounting Policies-Equity Method Investments” of Footnotes to Consolidated Financial Statements included elsewhere in this Form 10-K for additional information.

Indemnification

In the ordinary course of our business, we enter into contractual arrangements with our customers, suppliers and other parties under which we may agree to indemnify the other party to such arrangement from certain losses it incurs relating to our products or services or for losses arising from certain events as defined within the particular contract. Some of these indemnification obligations may not be subject to maximum loss limitations. Historically, payments we have made related to these indemnification obligations have been immaterial.

Item 7A. Quantitative and Qualitative Disclosures about Market Risk

Market risk is the risk of loss from adverse changes in market prices and rates. Our primary market risks include risks related to interest rates and foreign currency exchange rates.

Interest Rate Risk

As of December 31, 2016, we had outstanding total indebtedness of approximately \$158.8 million, including capital lease obligations. As of December 31, 2016, all of this indebtedness, other than borrowings under our Credit Facility (described below) accrues interest at fixed interest rates.

As our borrowings under the Credit Facility are subject to variable interest rates, we are subject to interest rate risk to the extent we have outstanding balances under the Credit Facility. We are therefore impacted by changes in LIBOR and/or our bank's base rates. We may, from time to time, use derivative financial instruments to help mitigate rising interest rates under our Credit Facility. We do not use derivatives for trading or speculative purposes and only enter into contracts with major financial institutions based on their credit rating and other factors.

Foreign Currency Exchange Rate Risk

Our operations are conducted in various countries around the world, and we receive revenue from these operations in a number of different currencies with the most significant of our international operations using British Pounds Sterling. As such, our earnings are subject to movements in foreign currency exchange rates when transactions are denominated in currencies other than the U.S. dollar, which is our functional currency, or the functional currency of many of our subsidiaries, which is not necessarily the U.S. dollar. To the extent that transactions of these subsidiaries are settled in currencies other than the U.S. dollar, a devaluation of these currencies versus the U.S. dollar could reduce the contribution from these subsidiaries to our consolidated results of operations as reported in U.S. dollars. Through our subsidiaries, we operate in a wide variety of jurisdictions, including the United Kingdom, Australia, the Netherlands, Brazil, China, Canada, Russia, the United Arab Emirates, Egypt and other countries. Our financial results may be affected by changes in foreign currency exchange rates. Our consolidated balance sheet at December 31, 2016 reflected approximately \$8.0 million of net working capital related to our foreign subsidiaries, a majority of which is within the United Kingdom. Our foreign subsidiaries receive their income and pay their expenses primarily in their local currencies. To the extent that transactions of these subsidiaries are settled in the local currencies, a devaluation of these currencies versus the U.S. dollar could reduce the contribution from these subsidiaries to our consolidated results of operations as reported in U.S. dollars. For the year ended December 31, 2016, we recorded net foreign currency losses of approximately \$3.1 million in other income, a majority of these losses are due to currency fluctuations related to our operations within Nigeria, partially offset by currency gains related to our operations in the United Kingdom.

Item 8. Financial Statements and Supplementary Data

The financial statements and related notes thereto required by this item begin at page F-1 hereof.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

Not applicable.

Item 9A. Controls and Procedures

(a) Evaluation of Disclosure Controls and Procedures. Disclosure controls and procedures are designed to ensure that information required to be disclosed in the reports we file with or submit to the SEC under the Securities Exchange Act of 1934, as amended (the "Exchange Act"), is recorded, processed, summarized and reported within the time period specified by the SEC's rules and forms. Disclosure controls and procedures are defined in Rule 13a-15(e) under the Exchange Act, and they include, without limitation, controls and procedures designed to ensure that information required to be disclosed under the Exchange Act is accumulated and communicated to management, including the principal executive officer and the principal financial officer, as appropriate, to allow timely decisions regarding

required disclosure.

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Our management carried out an evaluation of the effectiveness of the design and operation of our disclosure controls and procedures as of December 31, 2016. Based upon that evaluation, our principal executive officer and principal financial officer have concluded that our disclosure controls and procedures were effective as of December 31, 2016.

(b) Management's Report on Internal Control Over Financial Reporting. Our management is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Rules 13a-15(f) under the Exchange Act. Our internal control over financial reporting is 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. Our internal control over financial reporting includes those policies and procedures that:

- (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of our company;
provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial
- (ii) statements in accordance with generally accepted accounting principles, and that receipts and expenditures of our company are being made only in accordance with authorizations of our management and directors; and
- (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on the financial statements.

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.

Under the supervision and with the participation of our management, including our principal executive officer and principal financial officer, we assessed the effectiveness of our internal control over financial reporting as of December 31, 2016 based upon criteria established in the 2013 Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

The independent registered public accounting firm that has also audited our consolidated financial statements included in this Annual Report on Form 10-K has issued an audit report on our internal control over financial reporting. This report appears below.

(c) Changes in Internal Control over Financial Reporting. There was not any change in our internal control over financial reporting that occurred during the three months ended December 31, 2016, which has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Report of Independent Registered Public Accounting Firm

Board of Directors and Stockholders
ION Geophysical Corporation

We have audited the internal control over financial reporting of ION Geophysical Corporation (a Delaware corporation) and subsidiaries (the “Company”) as of December 31, 2016, based on criteria established in the 2013 Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). The Company’s management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management’s Report on Internal Control Over Financial Reporting (“Management’s Report”). Our responsibility is to express an opinion on the Company’s internal control over financial reporting based on our audit. We conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

A company’s internal control over financial reporting is a process designed 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.

In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2016, based on criteria established in the 2013 Internal Control-Integrated Framework issued by COSO.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the consolidated financial statements of the Company as of and for the year ended December 31, 2016, and our report dated February 9, 2017 expressed an unqualified opinion on those financial statements.

/s/ GRANT THORNTON LLP
Houston, Texas
February 9, 2017

Item 9B. Other Information
Not applicable.

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PART III

Item 10. Directors, Executive Officers and Corporate Governance

Reference is made to the information appearing in the definitive proxy statement, under “Item 1 — Election of Directors,” for our annual meeting of stockholders to be held on May 17, 2017 (the “2017 Proxy Statement”) to be filed with the SEC with respect to Directors, Executive Officers and Corporate Governance, which is incorporated herein by reference and made a part hereof in response to the information required by Item 10.

Item 11. Executive Compensation

Reference is made to the information appearing in the 2017 Proxy Statement, under “Executive Compensation,” to be filed with the SEC with respect to Executive Compensation, which is incorporated herein by reference and made a part hereof in response to the information required by Item 11.

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

Reference is made to the information appearing in the 2017 Proxy Statement, under “Item 1 — Ownership of Equity Securities of ION” and “Equity Compensation Plan Information,” to be filed with the SEC with respect to Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters, which is incorporated herein by reference and made a part hereof in response to the information required by Item 12.

Item 13. Certain Relationships and Related Transactions, and Director Independence

Reference is made to the information appearing in the 2017 Proxy Statement, under “Item 1 — Certain Transactions and Relationships,” to be filed with the SEC with respect to Certain Relationships and Related Transactions and Director Independence, which is incorporated herein by reference and made a part hereof in response to the information required by Item 13.

Item 14. Principal Accounting Fees and Services

Reference is made to the information appearing in the 2017 Proxy Statement, under “Principal Auditor Fees and Services,” to be filed with the SEC with respect to Principal Accountant Fees and Services, which is incorporated herein by reference and made a part hereof in response to the information required by Item 14.

PART IV

Item 15. Exhibits and Financial Statement Schedules

(a) List of Documents Filed

(1) Financial Statements

The financial statements filed as part of this report are listed in the “Index to Consolidated Financial Statements” on page F-1 hereof.

(2) Financial Statement Schedules

The following financial statement schedule is listed in the “Index to Consolidated Financial Statements” on page F-1 hereof, and is included as part of this Annual Report on Form 10-K:

Schedule II — Valuation and Qualifying Accounts

All other schedules are omitted because they are not applicable or the requested information is shown in the financial statements or noted therein.

(3) Exhibits

- 3.1 — Restated Certificate of Incorporation, as amended, filed on November 3, 2016 as Exhibit 3.1 to the Company’s Quarterly Report on Form 10-Q and incorporated by reference.
- 3.2 — Amended and Restated Bylaws of ION Geophysical Corporation filed on September 24, 2007 as Exhibit 3.5 to the Company’s Current Report on Form 8-K and incorporated herein by reference.
- 3.3 — Certificate of Ownership and Merger merging ION Geophysical Corporation with and into Input/Output, Inc. dated September 21, 2007, filed on September 24, 2007 as Exhibit 3.1 to the Company’s Current Report on Form 8-K and incorporated herein by reference.
- 4.1 — Certificate of Rights and Designations of Series D-1 Cumulative Convertible Preferred Stock, dated February 16, 2005 and filed on February 17, 2005 as Exhibit 3.1 to the Company’s Current Report on Form 8-K and incorporated herein by reference.
- 4.2 — Certificate of Elimination of Series B Preferred Stock dated September 24, 2007, filed on September 24, 2007 as Exhibit 3.2 to the Company’s Current Report on Form 8-K and incorporated herein by reference.
- 4.3 — Certificate of Elimination of Series C Preferred Stock dated September 24, 2007, filed on September 24, 2007 as Exhibit 3.3 to the Company’s Current Report on Form 8-K and incorporated herein by reference.
- 4.4 — Certificate of Designation of Series D-2 Cumulative Convertible Preferred Stock dated December 6, 2007, filed on December 6, 2007 as Exhibit 3.1 to the Company’s Current Report on Form 8-K and incorporated herein by reference.
- 4.5 — Certificate of Designations of Series A Junior Participating Preferred Stock of ION Geophysical Corporation effective as of December 31, 2008, filed on January 5, 2009 as Exhibit 3.1 to the Company’s Current Report on Form 8-K and incorporated herein by reference.
- 4.6 — Certificate of Elimination of Series A Junior Participating Preferred Stock dated February 10, 2012, filed on February 13, 2012 as Exhibit 3.1 to the Company’s Current Report on Form 8-K, and incorporated herein by reference.
- 4.7 — Indenture, dated May 13, 2013, among ION Geophysical Corporation, the subsidiary guarantors named therein, Wilmington Trust, National Association, as trustee, and U.S. Bank National Association, as collateral agent, filed on May 13, 2013 as Exhibit 4.1 to the Company’s Current Report on Form 8-K and incorporated herein by reference.
- 4.8 — Registration Rights Agreement, dated May 13, 2013, among ION Geophysical Corporation, the subsidiary guarantors named therein and Citigroup Global Markets Inc. and Wells Fargo Securities, LLC, as representatives of the initial purchasers named therein, filed on May 13, 2013 as Exhibit 4.2 to the Company’s Current Report on Form 8-K and incorporated herein by reference.
- 4.9 —

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Certificate of Elimination of Series D-1 Cumulative Convertible Preferred Stock dated September 30, 2013, filed on September 30, 2013 as Exhibit 3.1 to the Company's Current Report on Form 8-K and incorporated herein by reference.

- 4.10 — Certificate of Elimination of Series D-2 Cumulative Convertible Preferred Stock dated September 30, 2013, filed on September 30, 2013 as Exhibit 3.2 to the Company's Current Report on Form 8-K and incorporated herein by reference.

- ~~**10.1~~ Amended and Restated 1990 Stock Option Plan, filed on June 9, 1999 as Exhibit 4.2 to the Company's Registration Statement on Form S-8 (Registration No. 333-80299), and incorporated herein by reference.
- ~~10.2~~ Landlord and Input/Output, Inc. as Tenant, filed on March 31, 2006 as Exhibit 10.2 to the Company's Annual Report on Form 10-K for the year ended December 31, 2005, and incorporated herein by reference.
- ~~10.3~~ Landlord and Input/Output, Inc. as Tenant, filed on March 31, 2006 as Exhibit 10.3 to the Company's Annual Report on Form 10-K for the year ended December 31, 2005, and incorporated herein by reference.
- ~~**10.4~~ Input/Output, Inc. Amended and Restated 1996 Non-Employee Director Stock Option Plan, filed on June 9, 1999 as Exhibit 4.3 to the Company's Registration Statement on Form S-8 (Registration No. 333-80299), and incorporated herein by reference.
- ~~**10.5~~ Amendment No. 1 to the Input/Output, Inc. Amended and Restated 1996 Non-Employee Director Stock Option Plan dated September 13, 1999 filed on November 14, 1999 as Exhibit 10.4 to the Company's Quarterly Report on Form 10-Q for the fiscal quarter ended August 31, 1999 and incorporated herein by reference.
- ~~**10.6~~ Input/Output, Inc. Employee Stock Purchase Plan, filed on March 28, 1997 as Exhibit 4.4 to the Company's Registration Statement on Form S-8 (Registration No. 333-24125), and incorporated herein by reference.
- ~~**10.7~~ Fifth Amended and Restated - 2004 Long-Term Incentive Plan, filed as Appendix A to the definitive proxy statement for the 2010 Annual Meeting of Stockholders of ION Geophysical Corporation, filed on April 21, 2010, and incorporated herein by reference.
- ~~10.8~~ Registration Rights Agreement dated as of November 16, 1998, by and among the Company and The Laitram Corporation, filed on March 12, 2004 as Exhibit 10.7 to the Company's Annual Report on Form 10-K for the year ended December 31, 2003, and incorporated herein by reference.
- ~~**10.9~~ Input/Output, Inc. 1998 Restricted Stock Plan dated as of June 1, 1998, filed on June 9, 1999 as Exhibit 4.7 to the Company's Registration Statement on S-8 (Registration No. 333-80297), and incorporated herein by reference.
- ~~**10.10~~ Input/Output Inc. Non-qualified Deferred Compensation Plan, filed on April 1, 2002 as Exhibit 10.14 to the Company's Annual Report on Form 10-K for the year ended December 31, 2001, and incorporated herein by reference.
- ~~**10.11~~ Input/Output, Inc. 2000 Restricted Stock Plan, effective as of March 13, 2000, filed on August 17, 2000 as Exhibit 10.27 to the Company's Annual Report on Form 10-K for the fiscal year ended May 31, 2000, and incorporated herein by reference.
- ~~**10.12~~ Input/Output, Inc. 2000 Long-Term Incentive Plan, filed on November 6, 2000 as Exhibit 4.7 to the Company's Registration Statement on Form S-8 (Registration No. 333-49382), and incorporated by reference herein.
- ~~**10.13~~ Employment Agreement dated effective as of March 31, 2003, by and between the Company and Robert P. Peebler, filed on March 31, 2003 as Exhibit 10.1 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- ~~**10.14~~ First Amendment to Employment Agreement dated September 6, 2006, between Input/Output, Inc. and Robert P. Peebler, filed on September 7, 2006, as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- ~~**10.15~~ Second Amendment to Employment Agreement dated February 16, 2007, between Input/Output, Inc. and Robert P. Peebler, filed on February 16, 2007 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- ~~**10.16~~ Third Amendment to Employment Agreement dated as of August 20, 2007 between Input/Output, Inc. and Robert P. Peebler, filed on August 21, 2007 as Exhibit 10.2 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- ~~**10.17~~ Fourth Amendment to Employment Agreement, dated as of January 26, 2009, between ION Geophysical Corporation and Robert P. Peebler, filed on January 29, 2009 as Exhibit 10.1 to the Company's Current

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Report on Form 8-K and incorporated herein by reference.

**10.18 Employment Agreement dated effective as of June 15, 2004, by and between the Company and David L. Roland, filed on August 9, 2004 as Exhibit 10.5 to the Company's Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2004, and incorporated herein by reference.

**10.19 GX Technology Corporation Employee Stock Option Plan, filed on August 9, 2004 as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2004, and incorporated herein by reference.

- 10.20 Concept Systems Holdings Limited Share Acquisition Agreement dated February 23, 2004, filed on March 5, 2004 as Exhibit 2.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- 10.21 Registration Rights Agreement by and between ION Geophysical Corporation and 1236929 Alberta Ltd. dated September 18, 2008, filed on November 7, 2008 as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q and incorporated herein by reference.
- **10.22 Form of Employment Inducement Stock Option Agreement for the Input/Output, Inc. — Concept Systems Employment Inducement Stock Option Program, filed on July 27, 2004 as Exhibit 4.1 to the Company's Registration Statement on Form S-8 (Reg. No. 333-117716), and incorporated herein by reference.
- **10.23 Form of Employee Stock Option Award Agreement for ARAM Systems Employee Inducement Stock Option Program, filed on November 14, 2008 as Exhibit 4.4 to the Company's Registration Statement on Form S-8 (Registration No. 333-155378) and incorporated herein by reference.
- **10.24 Input/Output, Inc. 2003 Stock Option Plan, dated March 27, 2003, filed as Appendix B of the Company's definitive proxy statement filed with the SEC on April 30, 2003, and incorporated herein by reference.
- **10.25 Form of Employment Inducement Stock Option Agreement for the Input/Output, Inc. — GX Technology Corporation Employment Inducement Stock Option Program, filed on April 4, 2005 as Exhibit 4.1 to the Company's Registration Statement on Form S-8 (Reg. No. 333-123831), and incorporated herein by reference.
- **10.26 ION Stock Appreciation Rights Plan dated November 17, 2008, filed as Exhibit 10.47 to the Company's Annual Report on Form 10-K for the year ended December 31, 2008, and incorporated herein by reference.
- 10.27 Canadian Master Loan and Security Agreement dated as of June 29, 2009 by and among ICON ION, LLC, as lender, ION Geophysical Corporation and ARAM Rentals Corporation, a Nova Scotia corporation, filed on August 6, 2009 as Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2009, and incorporated herein by reference.
- 10.28 Master Loan and Security Agreement (U.S.) dated as of June 29, 2009 by and among ICON ION, LLC, as lender, ION Geophysical Corporation and ARAM Seismic Rentals, Inc., a Texas corporation, filed on August 6, 2009 as Exhibit 10.4 to the Company's Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2009, and incorporated herein by reference.
- 10.29 Registration Rights Agreement dated as of October 23, 2009 by and between ION Geophysical Corporation and BGP Inc., China National Petroleum Corporation filed on March 1, 2010 as Exhibit 10.54 to the Company's Annual Report on Form 10-K for the year ended December 31, 2009, and incorporated herein by reference.
- 10.30 Stock Purchase Agreement dated as of March 19, 2010, by and between ION Geophysical Corporation and BGP Inc., China National Petroleum Corporation, filed on March 31, 2010 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- 10.31 Investor Rights Agreement dated as of March 25, 2010, by and between ION Geophysical Corporation and BGP Inc., China National Petroleum Corporation, filed on March 31, 2010 as Exhibit 10.2 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- 10.32 Share Purchase Agreement dated as of March 24, 2010, by and among ION Geophysical Corporation, INOVA Geophysical Equipment Limited and BGP Inc., China National Petroleum Corporation, filed on March 31, 2010 as Exhibit 10.3 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- 10.33 Joint Venture Agreement dated as of March 24, 2010, by and between ION Geophysical Corporation and BGP Inc., China National Petroleum Corporation, filed on March 31, 2010 as Exhibit 10.4 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- **10.34 Fifth Amendment to Employment Agreement dated June 1, 2010, between ION Geophysical Corporation and Robert P. Peebler, filed on June 1, 2010 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- **10.35 —

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Employment Agreement dated August 2, 2011, effective as of January 1, 2012, between ION Geophysical Corporation and R. Brian Hanson, filed on November 3, 2011 as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarterly period ended September 30, 2011, and incorporated herein by reference.

**10.36 Employment Agreement dated effective as of November 28, 2011, between ION Geophysical Corporation and Gregory J. Heinlein, filed on December 1, 2011 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.

**10.37 First Amendment to Credit Agreement and Loan Documents dated May 29, 2012, filed on May 29, 2012 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.

- ~~**10.38~~ Consulting Services Agreement dated January 1, 2013, between ION Geophysical Corporation and The Pebbler Group LLC, filed on January 4, 2013 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- *10.39 ~~Second Amended and Restated 2013 Long-Term Incentive Plan.~~
Purchase Agreement, dated May 8, 2013, among ION Geophysical Corporation, the subsidiary guarantors named therein and Citigroup Global Markets Inc. and Wells Fargo Securities, LLC, as representatives of the initial purchasers named therein, filed on May 13, 2013 as Exhibit 10.1 to the Company's Current Report on Form 8-K and incorporated herein by reference
- 10.40 ~~Second Lien Intercreditor Agreement by and among China Merchants Bank Co., Ltd., New York Branch, as administrative agent, first lien representative for the first lien secured parties and collateral agent for the first lien secured parties, Wilmington Trust Company, National Association, as trustee and second lien~~
~~representative for the second lien secured parties, and U.S. Bank National Association, as collateral agent for the second lien secured parties, and acknowledged and agreed to by ION Geophysical Corporation and the other grantors named therein, filed on May 13, 2013 as Exhibit 10.2 to the Company's Current Report on Form 8-K and incorporated herein by reference~~
- 10.41 ~~Revolving Credit and Security Agreement dated as of August 22, 2014 among PNC Bank, National Association, as agent for lenders, the lenders from time to time party thereto, as lenders, and PNC Capital Markets LLC, as lead arranger and bookrunner, with ION Geophysical Corporation, ION Exploration Products (U.S.A.), Inc., I/O Marine Systems, Inc. and GX Technology Corporation, as borrowers, filed on November 6, 2014 as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarterly period ended September 30, 2014, and incorporated herein by reference.~~
- 10.42 ~~Transition and Separation Agreement dated effective as of October 30, 2014, by and between ION Geophysical Corporation and Gregory J. Heinlein.~~
- ~~**10.43~~ ~~Employment Agreement dated effective as of November 13, 2014, between ION Geophysical Corporation and Steve Bate.~~
- ~~**10.44~~ ~~Form of Rights Agreement dated March 1, 2015 issued under the ION Stock Appreciation Rights Plan dated November 17, 2008, filed on May 7, 2015 as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarterly period ended March 31, 2015, and incorporated herein by reference.~~
- 10.45 ~~First Amendment to Revolving Credit and Security Agreement dated as of August 4, 2015 among PNC Bank, National Association, as lender and agent, the lenders from time to time party thereto, as lenders, with ION Geophysical Corporation, ION Exploration Products (U.S.A.), Inc., I/O Marine Systems, Inc. and GX Technology Corporation, as borrowers, filed on August 6, 2015 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.~~
- 10.46 ~~Subsidiaries of the Company.~~
- *21.1 ~~Consent of Grant Thornton LLP.~~
- *23.1 ~~The Power of Attorney is set forth on the signature page hereof.~~
- *24.1 ~~Certification of Chief Executive Officer Pursuant to Rule 13a-14(a) or Rule 15d-14(a).~~
- *31.1 ~~Certification of Chief Financial Officer Pursuant to Rule 13a-14(a) or Rule 15d-14(a).~~
- *31.2 ~~Certification of Chief Executive Officer Pursuant to 18 U.S.C. §1350.~~
- *32.1 ~~Certification of Chief Financial Officer Pursuant to 18 U.S.C. §1350.~~
- *32.2 ~~The following materials are formatted in Extensible Business Reporting Language (XBRL): (i) Consolidated Balance Sheets at December 31, 2016 and 2015, (ii) Consolidated Statements of Operations for the years ended December 31, 2016, 2015 and 2014, (iii) Comprehensive Income (Loss) for the years ended December 31, 2016, 2015 and 2014, (iv) Consolidated Statements of Cash Flows for the years ended December 31, 2016, 2015 and 2014, (v) Consolidated Statements of Stockholders' Equity for the years ended December 31, 2016, 2015 and 2014, (vi) Footnotes to Consolidated Financial Statements and (vii) Schedule II – Valuation and Qualifying Accounts.~~
- *101 ~~Consolidated Balance Sheets at December 31, 2016 and 2015, (ii) Consolidated Statements of Operations for the years ended December 31, 2016, 2015 and 2014, (iii) Comprehensive Income (Loss) for the years ended December 31, 2016, 2015 and 2014, (iv) Consolidated Statements of Cash Flows for the years ended December 31, 2016, 2015 and 2014, (v) Consolidated Statements of Stockholders' Equity for the years ended December 31, 2016, 2015 and 2014, (vi) Footnotes to Consolidated Financial Statements and (vii) Schedule II – Valuation and Qualifying Accounts.~~

* Filed herewith.

**Management contract or compensatory plan or arrangement.

(b) Exhibits required by Item 601 of Regulation S-K.

Reference is made to subparagraph (a) (3) of this Item 15, which is incorporated herein by reference.

(c) Not applicable.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, as amended, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized in the City of Houston, State of Texas, on February 9, 2017.

ION GEOPHYSICAL CORPORATION

By /s/ R. Brian Hanson
 R. Brian Hanson
 President and Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints R. Brian Hanson and Jamey S. Seely and each of them, as his or her true and lawful attorneys-in-fact and agents with full power of substitution and re-substitution for him or her and in his or her name, place and stead, in any and all capacities, to sign any and all documents relating to the Annual Report on Form 10-K for the year ended December 31, 2016, including any and all amendments and supplements thereto, and to file the same with all exhibits thereto and other documents in connection therewith with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents full power and authority to do and perform each and every act and thing requisite and necessary to be done in and about the premises, as fully as to all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents or their or his or her substitute or substitutes may lawfully do or cause to be done by virtue hereof.

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

Name	Capacities	Date
/S/ R. BRIAN HANSON R. Brian Hanson	President, Chief Executive Officer and Director (Principal Executive Officer)	February 9, 2017
/S/ STEVEN A. BATE Steven A. Bate	Executive Vice President and Chief Financial Officer (Principal Financial Officer)	February 9, 2017
/S/ SCOTT SCHWAUSCH Scott Schwausch	Vice President and Corporate Controller (Principal Accounting Officer)	February 9, 2017
/S/ JAMES M. LAPEYRE, JR. James M. Lapeyre, Jr.	Chairman of the Board of Directors and Director	February 9, 2017
/S/ DAVID H. BARR David H. Barr	Director	February 9, 2017
/S/ HAO HUIMIN Hao Huimin	Director	February 9, 2017

Name	Capacities	Date
/S/ MICHAEL C. JENNINGS Michael C. Jennings	Director	February 9, 2017
/S/ FRANKLIN MYERS Franklin Myers	Director	February 9, 2017
/S/ S. JAMES NELSON, JR. S. James Nelson, Jr.	Director	February 9, 2017
/S/ JOHN N. SEITZ John N. Seitz	Director	February 9, 2017

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Report of Independent Registered Public Accounting Firm

Board of Directors and Stockholders
ION Geophysical Corporation

We have audited the accompanying consolidated balance sheets of ION Geophysical Corporation (a Delaware corporation) and subsidiaries (the "Company") as of December 31, 2016 and 2015, and the related consolidated statements of operations, comprehensive loss, stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2016. Our audits of the basic consolidated financial statements included the financial statement schedule listed in the index appearing under Item 15(a). These financial statements and financial statement schedule are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements and financial statement schedule based on our audits.

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

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of ION Geophysical Corporation and subsidiaries as of December 31, 2016 and 2015, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 2016 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the related financial statement schedule, when considered in relation to the basic consolidated financial statements taken as a whole, presents fairly, in all material respects, the information set forth therein.

As discussed in Note 1 to the consolidated financial statements, the Company changed its method of presentation for debt issuance costs in 2016 due to the adoption of FASB Accounting Standards Update No. 2015-03, Interest - Imputation of Interest.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the Company's internal control over financial reporting as of December 31, 2016, based on criteria established in the 2013 Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), and our report dated February 9, 2017 expressed an unqualified opinion thereon.

/s/ GRANT THORNTON LLP

Houston, Texas
February 9, 2017

ION GEOPHYSICAL CORPORATION AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS

	December 31,	
	2016	2015
	(In thousands, except share data)	
ASSETS		
Current assets:		
Cash and cash equivalents	\$52,652	\$84,933
Accounts receivable, net	20,770	44,365
Unbilled receivables	13,415	19,937
Inventories	15,241	32,721
Prepaid expenses and other current assets	9,559	14,807
Total current assets	111,637	196,763
Property, plant, equipment and seismic rental equipment, net	67,488	72,027
Multi-client data library, net	105,935	132,237
Goodwill	22,208	26,274
Intangible assets, net	3,103	4,810
Other assets	2,845	2,977
Total assets	\$313,216	\$435,088
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Current maturities of long-term debt	\$14,581	\$7,912
Accounts payable	26,889	29,799
Accrued expenses	26,240	34,287
Accrued multi-client data library royalties	23,663	25,045
Deferred revenue	3,709	6,560
Total current liabilities	95,082	103,603
Long-term debt, net of current maturities	144,209	175,080
Other long-term liabilities	20,527	44,365
Total liabilities	259,818	323,048
Equity:		
Common stock, \$0.01 par value; authorized 26,666,667 shares; outstanding 11,792,447 and 10,702,689 shares at December 31, 2016 and 2015, respectively, net of treasury stock	118	107
Additional paid-in capital	899,198	894,715
Accumulated deficit	(824,679)	(759,531)
Accumulated other comprehensive loss	(21,748)	(14,781)
Treasury stock, at cost, zero and 353,124 shares at December 31, 2016 and 2015 respectively	—	(8,551)
Total stockholders' equity	52,889	111,959
Noncontrolling interests	509	81
Total equity	53,398	112,040
Total liabilities and equity	\$313,216	\$435,088
See accompanying Footnotes to Consolidated Financial Statements.		

ION GEOPHYSICAL CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF OPERATIONS

	Years Ended December 31,		
	2016	2015	2014
	(In thousands, except per share data)		
Service revenues	\$ 130,640	\$ 160,480	\$ 384,938
Product revenues	42,168	61,033	124,620
Total net revenues	172,808	221,513	509,558
Cost of services	115,763	179,816	278,627
Cost of products	21,013	33,295	68,608
Impairment of multi-client data library	—	399	100,100
Gross profit	36,032	8,003	62,223
Operating expenses:			
Research, development and engineering	17,833	26,445	41,009
Marketing and sales	17,371	30,493	39,682
General, administrative and other operating expenses	43,999	51,697	76,177
Impairment of goodwill and intangible assets	—	—	23,284
Total operating expenses	79,203	108,635	180,152
Loss from operations	(43,171)	(100,632)	(117,929)
Interest expense, net	(18,485)	(18,753)	(19,382)
Equity in losses of investments	—	—	(49,485)
Other income	1,350	98,275	79,860
Loss before income taxes	(60,306)	(21,110)	(106,936)
Income tax expense	4,421	4,044	20,582
Net loss	(64,727)	(25,154)	(127,518)
Net (income) loss attributable to noncontrolling interests	(421)	32	(734)
Net loss attributable to ION	\$(65,148)	\$(25,122)	\$(128,252)
Net loss per share:			
Basic	\$(5.71)	\$(2.29)	\$(11.72)
Diluted	\$(5.71)	\$(2.29)	\$(11.72)
Weighted average number of common shares outstanding:			
Basic	11,400	10,957	10,939
Diluted	11,400	10,957	10,939

See accompanying Footnotes to Consolidated Financial Statements.

ION GEOPHYSICAL CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS

	Years Ended December 31,		
	2016	2015	2014
	(In thousands)		
Net loss	\$(64,727)	\$(25,154)	\$(127,518)
Other comprehensive loss, net of taxes, as appropriate:			
Foreign currency translation adjustments	(6,967)	(1,974)	(882)
Equity interest in investee's other comprehensive loss	—	—	(841)
Unrealized gain on available-for-sale securities	—	—	28
Other changes in other comprehensive income	—	—	26
Total other comprehensive loss, net of taxes	(6,967)	(1,974)	(1,669)
Comprehensive net loss	(71,694)	(27,128)	(129,187)
Comprehensive (income) loss attributable to noncontrolling interests	(421)	32	(734)
Comprehensive net loss attributable to ION	\$(72,115)	\$(27,096)	\$(129,921)

See accompanying Footnotes to Consolidated Financial Statements.

ION GEOPHYSICAL CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS

	Years Ended December 31,		
	2016	2015	2014
	(In thousands)		
Cash flows from operating activities:			
Net loss	\$(64,727)	\$(25,154)	\$(127,518)
Adjustments to reconcile net loss to net cash provided by (used in) operating activities:			
Depreciation and amortization (other than multi-client library)	21,975	26,527	27,656
Amortization of multi-client data library	33,335	35,784	64,374
Stock-based compensation expense	3,267	5,486	8,707
Reduction of loss contingency related to legal proceedings	(1,168)	(101,978)	(69,557)
Equity in losses of investments	—	—	49,485
Gain on sale of Source product line	—	—	(6,522)
Gain on sale of cost method investments	—	—	(5,463)
Impairment of goodwill and intangible assets	—	—	23,284
Impairment of multi-client data library	—	399	100,100
Loss on bond exchange	2,182	—	—
Write-down of excess and obsolete inventory	429	151	6,952
Write-down of receivables from INOVA Geophysical	—	—	5,510
Deferred income taxes	(1,181)	7,444	(437)
Change in operating assets and liabilities:			
Accounts receivable	20,426	69,491	41,943
Unbilled receivables	6,543	1,630	26,762
Inventories	2,312	2,251	(13,892)
Accounts payable, accrued expenses and accrued royalties	(5,085)	(30,264)	(4,771)
Deferred revenue	(2,759)	(1,571)	(8,382)
Other assets and liabilities	(13,978)	(6,720)	11,549
Net cash provided by (used in) operating activities	1,571	(16,524)	129,780
Cash flows from investing activities:			
Investment in multi-client data library	(14,884)	(45,558)	(67,785)
Purchase of property, plant, equipment and seismic rental equipment	(1,488)	(19,241)	(8,264)
Repayment of (net advances to) INOVA Geophysical	—	—	1,000
Net investment in and advances to OceanGeo B.V. prior to its consolidation	—	—	(3,074)
Net proceeds from sale of Source product line	—	—	14,394
Proceeds from sale of cost method investments	2,698	—	14,051
Other investing activities	30	1,263	928
Net cash used in investing activities	(13,644)	(63,536)	(48,750)
Cash flows from financing activities:			
Borrowings under revolving line of credit	15,000	—	15,000
Repayments under revolving line of credit	(5,000)	—	(50,000)
Payments on notes payable and long-term debt	(8,634)	(7,452)	(12,998)
Cost associated with issuance of debt	(6,744)	(145)	(2,194)
Acquisition of non-controlling interest	—	—	(6,000)
Repurchase of common stock	(964)	(1,989)	—
Payments to repurchase bonds	(15,000)	—	—
Other financing activities	(252)	73	218
Net cash used in financing activities	(21,594)	(9,513)	(55,974)

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Effect of change in foreign currency exchange rates on cash and cash equivalents	1,386	898	496
Net (decrease) increase in cash and cash equivalents	(32,281)	(88,675)	25,552
Cash and cash equivalents at beginning of period	84,933	173,608	148,056
Cash and cash equivalents at end of period	\$52,652	\$84,933	\$173,608

See accompanying Footnotes to Consolidated Financial Statements.

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ION GEOPHYSICAL CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

(In thousands, except shares)	Common Stock		Additional Paid-In Capital	Accumulated Deficit	Accumulated Other Comprehensive Loss	Treasury Stock	Noncontrolling Interests	Total Equity
	Shares	Amount						
Balance at January 1, 2014	10,915,851	\$ 109	\$ 881,497	\$(606,157)	\$(11,138)	\$(6,565)	\$ 139	\$ 257,885
Net loss (a)	—	—	—	(128,252)	—	—	18	(128,234)
Translation adjustment	—	—	—	—	(882)	—	(58)	(940)
Change in fair value of effective cash flow hedges (net of taxes)	—	—	—	—	26	—	—	26
Equity interest in INOVA Geophysical's other comprehensive loss	—	—	—	—	(841)	—	—	(841)
Unrealized gain (loss) on available-for-sale securities	—	—	—	—	28	—	—	28
Stock-based compensation expense	—	—	8,707	—	—	—	—	8,707
Exercise of stock options	1,900	—	95	—	—	—	—	95
Vesting of restricted stock units/awards	44,162	1	(1)	—	—	—	—	—
Restricted stock cancelled for employee minimum income taxes	(9,075)	—	(350)	—	—	—	—	(350)
Issuance of stock for the ESPP	12,768	—	482	—	—	—	—	482
Tax benefits from stock-based compensation	—	—	(1,146)	—	—	—	—	(1,146)
Balance at December 31, 2014	10,965,606	110	889,284	(734,409)	(12,807)	(6,565)	99	135,712
Net loss (a)	—	—	—	(25,122)	—	—	4	(25,118)
Translation adjustment	—	—	—	—	(1,974)	—	(22)	(1,996)
Stock-based compensation expense	—	—	5,486	—	—	—	—	5,486
Vesting of restricted stock units/awards	29,191	—	—	—	—	—	—	—
Purchase of treasury shares	(296,488)	(3)	—	—	—	(1,986)	—	(1,989)
Restricted stock cancelled for employee minimum income taxes	(6,208)	—	(126)	—	—	—	—	(126)
Issuance of stock for the ESPP	10,588	—	215	—	—	—	—	215
Purchase of subsidiary shares from	—	—	(144)	—	—	—	—	(144)

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noncontrolling interest									
Balance at December 31, 2015	10,702,689	107	894,715	(759,531)	(14,781)	(8,551)	81		112,040
Net loss	—	—	—	(65,148)	—	—	421		(64,727)
Translation adjustment	—	—	—	—	(6,967)	—	7		(6,960)
Stock-based compensation expense	—	—	3,267	—	—	—	—		3,267
Vesting of restricted stock units/awards	40,495	—	—	—	—	—	—		—
Purchase of treasury shares	(155,304)	(1)	—	—	—	(963)	—		(964)
Restricted stock cancelled for employee minimum income taxes	(4,973)	—	(22)	—	—	—	—		(22)
Issuance of stock for the ESPP	4,100	—	23	—	—	—	—		23
Issuance of stock in bond exchange	1,205,440	12	1,215	—	—	9,514	—		10,741
Balance at December 31, 2016	11,792,447	\$ 118	\$ 899,198	\$(824,679)	\$(21,748)	\$—	\$ 509		\$53,398

Net income attributable to noncontrolling interests for 2015 and 2014 excludes less than \$(0.1) million and \$0.7 (a) million, respectively, related to the redeemable noncontrolling interests, which is reported in the mezzanine equity section of the Consolidated Balance Sheet.

(b) Except for 2016, the figures set forth in the tables above have been retroactively adjusted to reflect the one-for-fifteen reverse stock split completed on February 4, 2016.

See accompanying Footnotes to Consolidated Financial Statements.

ION GEOPHYSICAL CORPORATION AND SUBSIDIARIES
 FOOTNOTES TO CONSOLIDATED FINANCIAL STATEMENTS

(1) Summary of Significant Accounting Policies

General Description and Principles of Consolidation

ION Geophysical Corporation and its subsidiaries offer a full suite of services and products for seismic data acquisition and processing. The consolidated financial statements include the accounts of ION Geophysical Corporation and its majority-owned subsidiaries (collectively referred to as the “Company” or “ION”). Intercompany balances and transactions have been eliminated. Certain reclassifications were made to previously reported amounts in the consolidated financial statements and notes thereto to make them consistent with the current presentation format.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Significant estimates are made at discrete points in time based on relevant market information. These estimates may be subjective in nature and involve uncertainties and matters of judgment and, therefore, cannot be determined with precision. Areas involving significant estimates include, but are not limited to, accounts and unbilled receivables, inventory valuation, sales forecasts related to multi-client data libraries, goodwill and intangible asset valuation and deferred taxes. Actual results could materially differ from those estimates.

Cash and Cash Equivalents

The Company considers all highly liquid investments with an original maturity of three months or less to be cash equivalents. The Company places its temporary cash investments with high credit quality financial institutions. At times such investments may be in excess of the Federal Deposit Insurance Corporation (FDIC) insurance limit. At December 31, 2016 and 2015, there was \$0.8 million and \$0.5 million, respectively, of short-term restricted cash used to secure standby and commercial letters of credit, which is included within Prepaid Expenses and Other Current Assets.

Accounts and Unbilled Receivables

Accounts and unbilled receivables are recorded at cost, less the related allowance for doubtful accounts. The Company considers current information and events regarding the customers’ ability to repay their obligations, such as the length of time the receivable balance is outstanding, the customers’ credit worthiness and historical experience. Unbilled receivables relate to revenues recognized on multi-client surveys, imaging services and ocean bottom acquisition services on a proportionate basis, and on licensing of multi-client data libraries for which invoices have not yet been presented to the customer.

Inventories

Inventories are stated at the lower of cost (primarily first-in, first-out method) or market. The Company provides reserves for estimated obsolescence or excess inventory equal to the difference between cost of inventory and its estimated market value based upon assumptions about future demand for the Company’s products, market conditions and the risk of obsolescence driven by new product introductions.

Property, Plant, Equipment and Seismic Rental Equipment

Property, plant, equipment and seismic rental equipment are stated at cost. Depreciation expense is provided straight-line over the following estimated useful lives:

	Years
Machinery and equipment	3-7
Buildings	5-25
Seismic rental equipment	3-5
Leased equipment and other	3-10

Expenditures for renewals and betterments are capitalized; repairs and maintenance are charged to expense as incurred. The cost and accumulated depreciation of assets sold or otherwise disposed of are removed from the accounts and any gain or loss is reflected in operating expenses.

The Company evaluates the recoverability of long-lived assets, including property, plant, equipment and seismic rental equipment, when indicators of impairment exist, relying on a number of factors including operating results, business plans, economic projections and anticipated future cash flows. Impairment in the carrying value of an asset held for use is recognized whenever anticipated future cash flows (undiscounted) from an asset are estimated to be less than its carrying value. The amount of the impairment recognized is the difference between the carrying value of the asset and its fair value.

Multi-Client Data Library

The multi-client data library consists of seismic surveys that are offered for licensing to customers on a non-exclusive basis. The capitalized costs include costs paid to third parties for the acquisition of data and related activities associated with the data creation activity and direct internal processing costs, such as salaries, benefits, computer-related expenses and other costs incurred for seismic data project design and management. For 2016, 2015 and 2014, the Company capitalized, as part of its multi-client data library, \$6.6 million, \$6.1 million and \$8.3 million, respectively, of direct internal processing costs. At December 31, 2016 and 2015, multi-client data library costs and accumulated amortization consisted of the following (in thousands):

	December 31,	
	2016	2015
Gross costs of multi-client data creation	\$906,306	\$899,273
Less accumulated amortization	(680,770)	(647,435)
Less impairments to multi-client data library	(119,601)	(119,601)
Total	\$105,935	\$132,237

The Company's method of amortizing the costs of an in-process multi-client data library (the period during which the seismic data is being acquired and/or processed, referred to as the "new venture" phase) consists of determining the percentage of actual revenue recognized to the total estimated revenues (which includes both revenues estimated to be realized during the new venture phase and estimated revenues from the licensing of the resulting "on-the-shelf" data survey) and multiplying that percentage by the total cost of the project (the sales forecast method). The Company considers a multi-client data survey to be complete when all work on the creation of the seismic data is finished and that data survey is available for licensing. Once a multi-client data survey is complete, the data survey is considered "on-the-shelf" and the Company's method of amortization is then the greater of (i) the sales forecast method or (ii) the straight-line basis over a four-year period. The greater amount of amortization resulting from the sales forecast method or the straight-line amortization policy is applied on a cumulative basis at the individual survey level. Under this policy, the Company first records amortization using the sales forecast method. The cumulative amortization recorded for each survey is then compared with the cumulative straight-line amortization. The four-year period utilized in this cumulative comparison commences when the data survey is determined to be complete. If the cumulative straight-line amortization is higher for any specific survey, additional amortization expense is recorded, resulting in accumulated amortization being equal to the cumulative straight-line amortization for such survey. The Company has determined the amortization period of four years based upon its historical experience that indicates that the majority of its revenues from multi-client surveys are derived during the acquisition and processing phases and during four years subsequent to survey completion.

The Company estimates the ultimate revenue expected to be derived from a particular seismic data survey over its estimated useful economic life to determine the costs to amortize, if greater than straight-line amortization. That estimate is made by the Company at the project's initiation. For a completed multi-client survey, the Company reviews the estimate quarterly. If during any such review, the Company determines that the ultimate revenue for a survey is expected to be materially more or less than the original estimate of ultimate revenue for such survey, the Company decreases or increases (as the case may be) the amortization rate attributable to the future revenue from such survey. In addition, in connection with such reviews, the Company evaluates the recoverability of the multi-client data library, and, if required under Accounting Standards Codification ("ASC") 360-10 "Impairment and Disposal of Long-Lived Assets," records an impairment charge with respect to such data. For a discussion of impairments of the Company's multi-client data library in 2014, see Footnote 2 "Cost Reduction Initiative, Impairments, Restructurings and Other Charges."

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Equity Method Investments

In accordance with ASC 810 “Consolidation,” the Company determined that INOVA Geophysical is a variable interest entity because the Company’s voting rights with respect to INOVA Geophysical are not proportionate to its ownership interest and substantially all of INOVA Geophysical’s activities are conducted on behalf of the Company and BGP, a related party to the Company. The Company is not the primary beneficiary of INOVA Geophysical because it does not have the power to direct the activities of INOVA Geophysical that most significantly impact its economic performance. Accordingly, the Company does not consolidate INOVA Geophysical, but instead accounts for INOVA Geophysical using the equity method of accounting. Under this method, an investment is carried at the acquisition cost, plus the Company’s equity in undistributed earnings or losses since acquisition, less distributions received. As provided by ASC 815 “Investments,” the Company accounted for its share of earnings in INOVA Geophysical on a one fiscal quarter lag basis. See further discussion regarding the Company’s equity method investment, including the full write-down of its investment in 2014, in INOVA Geophysical at Footnote 15 “Equity Method Investments.”

Noncontrolling Interests

The Company has non-redeemable noncontrolling interests. Non-redeemable noncontrolling interests in majority-owned affiliates are reported as a separate component of equity in “Noncontrolling interests” in the Consolidated Balance Sheets. Redeemable noncontrolling interests include noncontrolling ownership interests which provide the holders the rights, at certain times, to require the Company to acquire their ownership interest in those entities. These interests are not considered to be permanent equity and are reported in the mezzanine section of the Consolidated Balance Sheets at the greater of their carrying value or redemption value at the balance sheet date. Net loss in the Consolidated Statements of Operations is attributable to both controlling and noncontrolling interests.

Goodwill and Other Intangible Assets

Goodwill is allocated to reporting units, which are either the operating segment or one reporting level below the operating segment. For purposes of performing the impairment test for goodwill as required by ASC 350 “Intangibles — Goodwill and Other,” (“ASC 350”) the Company established the following reporting units: E&P Technology & Services, Optimization Software & Services, Devices and Ocean Bottom Services.

In accordance with ASC 350, the Company is required to evaluate the carrying value of its goodwill at least annually for impairment, or more frequently if facts and circumstances indicate that it is more likely than not impairment has occurred. The Company formally evaluates the carrying value of its goodwill for impairment as of December 31 for each of its reporting units. The Company first performs a qualitative assessment by evaluating relevant events or circumstances to determine whether it is more likely than not that the fair value of a reporting unit exceeds its carrying amount. If the Company is unable to conclude qualitatively that it is more likely than not that a reporting unit’s fair value exceeds its carrying value, then it will use a two-step quantitative assessment of the fair value of a reporting unit. To determine the fair value of these reporting units, the Company uses a discounted future returns valuation model, which includes a variety of level 3 inputs. The key inputs for the model include the operational three-year forecast for the Company and the then-current market discount factor. Additionally, the Company compares the sum of the estimated fair values of the individual reporting units less consolidated debt to the Company’s overall market capitalization as reflected by the Company’s stock price. If the carrying value of a reporting unit that includes goodwill is determined to be more than the fair value of the reporting unit, there exists the possibility of impairment of goodwill. An impairment loss of goodwill is measured in two steps by first allocating the fair value of the reporting unit to net assets and liabilities including recorded and unrecorded intangible assets to determine the implied carrying value of goodwill. The next step is to measure the difference between the carrying value of goodwill and the implied carrying value of goodwill, and, if the implied carrying value of goodwill is less than the carrying value of goodwill, an impairment loss is recorded equal to the difference. See further discussion below at Footnote 10 “Goodwill.”

The intangible assets, other than goodwill, relate to customer relationships. The Company amortizes its customer relationship intangible assets on an accelerated basis over a 10- to 15-year period, using the undiscounted cash flows of the initial valuation models. The Company uses an accelerated basis as these intangible assets were initially valued using an income approach, with an attrition rate that resulted in a pattern of declining cash flows over a 10- to 15-year period.

Following the guidance of ASC 360 “Property, Plant and Equipment,” the Company reviews the carrying values of these intangible assets for impairment if events or changes in the facts and circumstances indicate that their carrying value may not be recoverable. Any impairment determined is recorded in the current period and is measured by comparing the fair value of the related asset to its carrying value. See further discussion below at Footnote 9 “Details of Selected Balance Sheet Accounts — Intangible Assets.”

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Fair Value of Financial Instruments

The Company's financial instruments include cash and cash equivalents, short-term investments, accounts and unbilled receivables, accounts payable, accrued multi-client data library royalties and long-term debt. The carrying amounts of cash and cash equivalents, short-term investments, accounts and unbilled receivables, accounts payable and accrued multi-client data library royalties approximate fair value due to the highly liquid nature of these instruments. The fair value of the long-term debt is calculated using a market approach based upon Level 1 inputs, including an active market price.

Revenue Recognition

The Company derives revenue from the sale of (i) multi-client and proprietary surveys, licenses of "on-the-shelf" data libraries and imaging services within its E&P Technology & Services segment; (ii) seismic data acquisition systems and other seismic equipment; (iii) seismic command and control software systems and software solutions for operations management within its E&P Operations Optimization segment; and (iv) fully-integrated ocean bottom seismic ("OBS") solutions that include survey design and planning and data acquisition within its Ocean Bottom Services segment. All revenues of the E&P Technology & Services and Ocean Bottom Services segments and the services component of revenues for the Optimization Software & Services group within the E&P Operations Optimization segment are classified as services revenues. All other revenues are classified as product revenues.

Multi-Client and Proprietary Surveys, Data Libraries and Imaging Services — As multi-client surveys are being designed, acquired and/or processed (referred to as the "new venture" phase), the Company enters into non-exclusive licensing arrangements with its customers. License revenues from these new venture survey projects are recognized during the new venture phase as the seismic data is acquired and/or processed on a proportionate basis as work is performed. Under this method, the Company recognizes revenues based upon quantifiable measures of progress, such as kilometers acquired or days processed. Upon completion of a multi-client seismic survey, the seismic survey is considered "on-the-shelf," and licenses to the survey data are granted to customers on a non-exclusive basis. Revenues on licenses of completed multi-client data surveys are recognized when (a) a signed final master geophysical data license agreement and accompanying supplemental license agreement are returned by the customer; (b) the purchase price for the license is fixed or determinable; (c) delivery or performance has occurred; (d) and no significant uncertainty exists as to the customer's obligation, willingness or ability to pay. In limited situations, the Company has provided the customer with a right to exchange seismic data for another specific seismic data set. In these limited situations, the Company recognizes revenue at the earlier of the customer exercising its exchange right or the expiration of the customer's exchange right.

The Company also performs seismic surveys under contracts to specific customers, whereby the seismic data is owned by those customers. Revenue is recognized as the seismic data is acquired and/or processed on a proportionate basis as work is performed. The Company uses quantifiable measures of progress consistent with its multi-client surveys. Revenues from all imaging and other services are recognized when (a) persuasive evidence of an arrangement exists, (b) the price is fixed or determinable, and (c) collectability is reasonably assured. Revenues from contract services performed on a dayrate basis are recognized as the service is performed.

Acquisition Systems and Other Seismic Equipment — For the sales of acquisition systems and other seismic equipment, the Company follows the requirements of ASC 605-10 "Revenue Recognition" and recognizes revenue when (a) evidence of an arrangement exists; (b) the price to the customer is fixed and determinable; (c) collectability is reasonably assured; and (d) the acquisition system or other seismic equipment is delivered to the customer and risk of ownership has passed to the customer, or, in the case in which a substantive customer-specified acceptance clause exists in the contract, the later of delivery or when the customer-specified acceptance is obtained.

Software — For the sales of navigation, survey and quality control software systems, the Company follows the requirements of ASC 985-605 "Software Revenue Recognition" ("ASC 985-605"). The Company recognizes revenue from sales of these software systems when (a) evidence of an arrangement exists; (b) the price to the customer is fixed and determinable; (c) collectability is reasonably assured; and (d) the software is delivered to the customer and risk of ownership has passed to the customer, or, in the limited case in which a substantive customer-specified acceptance clause exists, the later of delivery or when the customer-specified acceptance is obtained. These arrangements generally include the Company providing related services, such as training courses, engineering services and annual

software maintenance. The Company allocates revenue to each element of the arrangement based upon vendor-specific objective evidence (“VSOE”) of fair value of the element or, if VSOE is not available for the delivered element, the residual method.

In addition to perpetual software licenses, the Company offers time-based software licenses. For time-based licenses, the Company recognizes revenue ratably over the contract term, which is generally two to five years.

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Ocean Bottom Services — The Company recognizes revenues as they are realized and earned and can be reasonably measured, based on contractual dayrates or on a fixed-price basis, and when collectability is reasonably assured. In connection with acquisition contracts, the Company may receive revenues for preparation and mobilization of equipment and personnel or for capital improvements to vessels. The Company defers the revenues earned and incremental costs incurred that are directly related to contract preparation and mobilization and recognizes such revenues and costs over the primary contract term of the acquisition project. The Company uses the ratio of square kilometers acquired as a percentage of the total square kilometers expected to be acquired over the primary term of the contract to recognize deferred revenues and amortize, in cost of services, the costs related to contract preparation and mobilization. The Company recognizes the costs of relocating vessels without contracts to more promising market sectors as such costs are incurred. Upon completion of acquisition contracts, the Company recognizes in earnings any demobilization fees received and expenses incurred.

Multiple-element Arrangements — When separate elements (such as an acquisition system, other seismic equipment and/or imaging and acquisition services) are contained in a single sales arrangement, or in related arrangements with the same customer, the Company follows the requirements of ASC 605-25 “Accounting for Multiple-Element Revenue Arrangement” (“ASC 605-25”).

This guidance requires that arrangement consideration be allocated at the inception of an arrangement to all deliverables using the relative selling price method. The Company allocates arrangement consideration to each deliverable qualifying as a separate unit of accounting in an arrangement based on its relative selling price. The Company determines its selling price using VSOE, if it exists, or otherwise third-party evidence (“TPE”). If neither VSOE nor TPE of selling price exists for a unit of accounting, the Company uses estimated selling price (“ESP”). The Company generally expects that it will not be able to establish TPE due to the nature of the markets in which the Company competes, and, as such, the Company typically will determine its selling price using VSOE or, if not available, ESP. VSOE is generally limited to the price charged when the same or similar product is sold on a standalone basis. If a product is seldom sold on a standalone basis, it is unlikely that the Company can determine VSOE for the product.

The objective of ESP is to determine the price at which the Company would transact if the product were sold by the Company on a standalone basis. The Company’s determination of ESP involves a weighting of several factors based on the specific facts and circumstances of the arrangement. Specifically, the Company considers the anticipated margin on the particular deliverable, the selling price and profit margin for similar products and the Company’s ongoing pricing strategy and policies.

Product Warranty — The Company generally warrants that its manufactured equipment will be free from defects in workmanship, materials and parts. Warranty periods generally range from 30 days to three years from the date of original purchase, depending on the product. The Company provides for estimated warranty as a charge to costs of sales at the time of sale. However, new information may become available, or circumstances (such as applicable laws and regulations) may change, thereby resulting in an increase or decrease in the amount required to be accrued for such matters (and therefore a decrease or increase in reported net income in the period of such change). In limited cases, the Company has provided indemnification of customers for potential intellectual property infringement claims relating to products sold.

Research, Development and Engineering

Research, development and engineering costs primarily relate to activities that are designed to improve the quality of the subsurface image and overall acquisition economics of the Company’s customers. The costs associated with these activities are expensed as incurred. These costs include prototype material and field testing expenses, along with the related salaries and stock-based compensation, facility costs, consulting fees, tools and equipment usage and other miscellaneous expenses associated with these activities.

Stock-Based Compensation

The Company accounts for stock-based compensation under the provisions of ASC 718, “Compensation – Stock Compensation” (“ASC 718”). The Company estimates the value of stock option awards on the date of grant using the Black-Scholes option pricing model. The determination of the fair value of stock-based payment awards on the date of grant using an option-pricing model is affected by the Company’s stock price as well as assumptions regarding a

number of subjective variables. These variables include, but are not limited to, expected stock price volatility over the term of the awards, actual and projected employee stock option exercise behaviors, risk-free interest rate and expected dividends. The Company recognizes stock-based compensation on the straight-line basis over the service period of each award (generally the award's vesting period).

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Income Taxes

Income taxes are accounted for under the liability method. Deferred income tax assets and liabilities are recognized for the future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases, including operating loss and tax credit carryforwards. Deferred income tax assets and liabilities are measured using enacted tax rates expected to apply in the years in which those temporary differences are expected to be recovered or settled. The Company records a valuation allowance when it is more likely than not that all or a portion of deferred tax assets will not be realized (see Footnote 6 “Income Taxes”). The effect on deferred income tax assets and liabilities of a change in tax rates is recognized in income in the period that includes the enactment date.

Debt Issuance Costs

In the first quarter of 2016, the Company adopted Accounting Standards Update (ASU) 2015-03, which requires entities to present debt issuance costs related to a debt liability as a direct deduction from the carrying amount of that debt liability on the balance sheet as opposed to being presented as a deferred charge, and ASU 2015-15, which adds paragraphs to ASU 2015-03 indicating that the SEC staff would not object to an entity deferring and presenting debt issuance costs related to line of credit arrangements as an asset and subsequently amortizing the deferred debt issuance costs ratably over the term of the line of credit arrangement, regardless of whether there are any outstanding borrowings on the line of credit arrangement.

For all periods presented in the Consolidated Financial Statements in this Form 10-K for the year ended December 31, 2016, unamortized debt issuance costs related to the Company’s long-term debt are reported on the Consolidated Balance Sheets as a reduction of the carrying value of the related debt. Prior to adoption, the Company reported the unamortized debt issuance costs in “Other Assets” on the Consolidated Balance Sheets. The change in presentation resulted in a reduction of “Other Assets” and “Long-Term Debt” of \$3.3 million as of December 31, 2015.

Comprehensive Net Loss

Comprehensive net loss as shown in the Consolidated Statements of Comprehensive Loss and the balance in Accumulated Other Comprehensive Loss as shown in the Consolidated Balance Sheets as of December 31, 2016 and 2015, consist of foreign currency translation adjustments, equity interest in INOVA Geophysical’s accumulated other comprehensive loss and unrealized gains or losses on available-for-sale securities.

Foreign Currency Gains and Losses

Assets and liabilities of the Company’s subsidiaries operating outside the United States that have a functional currency other than the U.S. dollar have been translated to U.S. dollars using the exchange rate in effect at the balance sheet date. Results of foreign operations have been translated using the average exchange rate during the periods of operation. Resulting translation adjustments have been recorded as a component of Accumulated Other Comprehensive Loss. Foreign currency transaction gains and losses are included in the Consolidated Statements of Operations in Other income as they occur. Total foreign currency transaction losses were \$3.3 million, \$2.1 million and \$1.8 million for 2016, 2015 and 2014, respectively.

Concentration of Foreign Sales Risk

The majority of the Company’s foreign sales are denominated in U.S. dollars. For 2016, 2015 and 2014, international sales comprised 78%, 66% and 74%, respectively, of total net revenues. The significant decline in oil price that began in the fourth quarter of 2014 have continued to impact the global market throughout 2015 and 2016. Since 2008, global economic problems and uncertainties have generally increased in scope and nature. To the extent that world events or economic conditions negatively affect the Company’s future sales to customers in many regions of the world, as well as the collectability of the Company’s existing receivables, the Company’s future results of operations, liquidity and financial condition would be adversely affected.

(2) Cost Reduction Initiatives, Impairments, Restructurings and Other Charges

The declines in oil prices and the depressed level of natural gas prices have negatively impacted the economic outlook of the Company’s exploration and production (“E&P”) company customers, which has also negatively impacted the outlook for the Company’s seismic contractor customers. In response to the decline in crude oil prices, E&P companies have reduced their capital expenditures and shifted their spending from exploration to production-related activities on existing assets. Seismic spending is discretionary; therefore, E&P companies have disproportionately cut their

spending on seismic-related services and products.

2016 Cost Reduction Initiatives and Other Charges

In April 2016, the Company implemented additional cost saving initiatives by reducing its current workforce by approximately 12%. Additional reductions were needed to further streamline the organization and bring it in line with the

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Company's current revenue stream, while maintaining the necessary core capabilities to continue our operations and strategic initiatives. In addition, the Company incurred losses in association with the exchange of a portion of its bonds during the second quarter 2016. During the twelve months ended December 31, 2016, the Company recognized the following pre-tax charges (in thousands):

	Severance charges ^(a)	Loss on bond exchange ^(b)	Total
Cost of goods sold	\$ 1,077	\$ —	\$ 1,077
Operating expenses	932	—	932
Other expense	—	2,182	2,182
Consolidated total	\$ 2,009	\$ 2,182	\$ 4,191

^(a) Represents severance charges related to the second quarter 2016 restructurings.

^(b) Represents a loss on exchange of bonds during the second quarter 2016.

2015 Cost Reduction Initiatives

During 2015, the Company continued its cost reduction initiatives by (i) centralizing the Company's global data processing capabilities to two core geographical hubs in the U.S. and the U.K., (ii) reducing the Company's marine repair infrastructure to two locations in the U.S. and U.A.E., (iii) making further reductions in personnel across all of the Company's segments primarily in the third quarter 2015 that, combined with reductions starting in December 2014 and continuing through the first nine months of 2015, have reduced the Company's full-time employee base by approximately 50% and (iv) reducing salaries by 10% for the majority of the Company's employees during 2015.

During 2015, the Company recognized the following pre-tax charges and credits (in thousands):

	Severance charges ^(a)	Facility charges ^(b)	Total
Cost of goods sold	\$ 3,981	\$ —	\$ 3,981
Operating expenses	1,910	1,323	3,233
Other (income) expense	—	1,618	1,618
Income tax benefit	(119)	(150)	(269)
Net income attributable to noncontrolling interest	(172)	—	(172)
Consolidated total	\$ 5,600	\$ 2,791	\$ 8,391

^(a) Represents severance charges related to 2015 restructurings, a portion of which relates to a noncontrolling interest.

^(b) Represents facility charges related to 2015 restructurings.

2014 Cost Reduction Initiatives

In the fourth quarter of 2014, the Company initiated restructurings across all of its segments, except for its Ocean Bottom Services segment. This restructuring involved the reduction of headcount in all those segments by approximately 10%. The Company incurred a total of \$2.3 million of severance charges, paid out in 2015.

During 2014, the Company re-evaluated the realizability of certain inventory and receivables. The Company wrote down inventory by recording \$7.0 million of charges related to excess and obsolete inventory and wrote down certain receivables totaling \$8.2 million, which includes receivables due from INOVA Geophysical. During 2014, the Company recognized the following pre-tax charges and credits (in thousands):

	Multi-client data library, net	Equity method investments ^(a)	Goodwill and Intangible Assets ^(b)	Asset write-downs and other	Severance charges	Total
Cost of goods sold	\$ 100,100	\$ —	\$ —	\$ 8,051	\$ 391	\$ 108,542
Operating expenses	—	—	23,284	8,214	^(c) 1,902	33,400
Equity in earnings (losses) of investments	—	34,199	—	—	—	34,199
Consolidated total	\$ 100,100	\$ 34,199	\$ 23,284	\$ 16,265	\$ 2,293	\$ 176,141

Represents the full write-down of the Company's equity method investment in INOVA Geophysical of \$30.7 million, in addition to the Company's share of charges related to excess and obsolete inventory and customer bad debts of \$3.5 million. For a discussion of the Company's impairment of its equity method investment, see Footnote 15 "Equity Method Investments" of the Footnotes to Consolidated Financial Statements contained elsewhere in this Annual Report on Form 10-K.

^(a) Includes an impairment of the goodwill on the Company's Devices reporting unit and an impairment of certain intangible assets. For a discussion of the impairment of the goodwill, see Footnote 10 "Goodwill." For a discussion of the impairment of the intangible asset, see Footnote 9 "Details of Selected Balance Sheet Accounts."

^(c) Includes outstanding receivables from INOVA Geophysical of \$5.5 million.

Impairment of Multi-client Data Library

During 2014, the Company wrote down the multi-client data library, primarily associated with Arctic and onshore North American programs, by \$100.1 million after it was determined that estimated future cash flows would not be sufficient to recover the carrying value due to then current market conditions. The reductions in exploration spending, discussed above, have had an impact on the Company's results of operations for 2014, especially those of its E&P Technology & Services segment. Sales of Arctic programs were specifically impacted by events in Russia. The decline in crude oil prices, as well as U.S. and European Union sanctions against Russia related to its actions in Ukraine, have both contributed to the devaluation of the Russian Ruble putting significant pressure on the Company's Russian-based customers and negatively impacting the appeal of seismic data located in Russia to potential non-Russian buyers. The Russian Ruble declined sharply throughout 2015 and into January 2016, reaching its lowest level since the currency was redenominated in 1998, before partially recovering during 2016. In North America, the land seismic market experienced softness. E&P customer spending in the natural gas shale plays have been limited due to associated gas being produced from unconventional oil wells in North America increasing natural gas supplies putting downward pressure on U.S. natural gas prices.

This impairment of the Company's multi-client data library was recorded because the net capitalized costs exceeded the fair value of the multi-client data library as measured by estimated future cash flows. The fair values of the individual libraries were measured using valuation techniques consistent with the income approach, converting future cash flows to a single discounted amount. Significant inputs used to determine the fair values of the libraries included estimates of: (i) revenues; (ii) future costs including royalties; and (iii) an appropriate discount rate. In order to estimate future cash flows, the Company considered historical cash flows, existing and future contracts and changes in the market environment and other factors that may affect future cash flows. To the extent applicable, the assumptions the Company used are consistent with forecasts that it is otherwise required to make (for example, in preparing its earnings forecasts). The use of this method involves inherent uncertainty. The Company has determined that the fair value measurements of this nonfinancial asset are level 3 in the fair value hierarchy.

(3) Segment and Geographic Information

The Company evaluates and reviews its results based on three business segments: E&P Technology & Services, E&P Operations Optimization, and Ocean Bottom Services. In August 2016, the Company announced its plans to realign its four business segments into three. Beginning in the third quarter of 2016, the Company changed its reportable segments as described below:

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E&P Technology & Services, formerly referred to as Solutions, continues to be comprised of the groups that support the Company's New Venture and Data Library (together multi-client) revenues and Imaging Services group.

E&P Operations Optimization is comprised of Devices, formerly referred to as Systems, and Optimization Software & Services, formerly referred to as Software. The manufacturing, engineering, research and development of ocean bottom systems is no longer a part of Devices, and are now within Ocean Bottom Services as noted below.

Ocean Bottom Services is comprised of OceanGeo, an ocean bottom data acquisition services company along with the manufacturing, engineering, research and development of ocean bottom systems.

Accordingly, all segment information presented herein has been revised to reflect the realignment of the Company's segments.

The Company has an equity ownership interest in its INOVA Geophysical joint venture. See Footnote 15 "Equity Method Investments" for the summarized financial information for INOVA Geophysical.

A summary of segment information follows (in thousands):

	Years Ended December 31,		
	2016	2015	2014
Net revenues:			
E&P Technology & Services:			
New Venture	\$27,362	\$48,294	\$98,649
Data Library	39,989	63,326	66,180
Total multi-client revenues	67,351	111,620	164,829
Imaging Services	25,538	45,630	113,075
Total	\$92,889	\$157,250	\$277,904
E&P Operations Optimization:			
Devices	\$26,746	\$36,269	\$88,417
Optimization Software & Services	16,756	27,994	39,993
Total	\$43,502	\$64,263	\$128,410
Ocean Bottom Services	\$36,417	\$—	\$103,244
Total	\$172,808	\$221,513	\$509,558
Gross profit (loss):			
E&P Technology & Services	\$4,708	\$13,508	\$(24,345)
E&P Operations Optimization	21,745	33,995	66,951
Ocean Bottom Services	9,579	(39,500)	19,617
Total	\$36,032	\$8,003	\$62,223
Gross margin:			
E&P Technology & Services	5	% 9	% (9)%
E&P Operations Optimization	50	% 53	% 52 %
Ocean Bottom Services	26	% —	% 19 %
Total	21	% 4	% 12 %
Loss from operations:			
E&P Technology & Services	\$(16,446)	\$(24,941)	\$(80,653) (a)
E&P Operations Optimization	9,652	20,131	20,201 (b)
Ocean Bottom Services	(1,756)	(55,080)	(4,440)
Support and other	(34,621)	(40,742)	(53,037)
Loss from operations	(43,171)	(100,632)	(117,929)
Interest expense, net	(18,485)	(18,753)	(19,382)
Equity in losses of investments	—	—	(49,485)
Other income	1,350	98,275	79,860
Loss before income taxes	\$(60,306)	\$(21,110)	\$(106,936)

(a) Includes a charge of \$100.1 million to write down the multi-client data library, impacting gross profit (loss), in addition to charges for the impairment of intangible assets and severance-related charges within the E&P Technology & Services segment.

(b) Includes a charge of \$21.9 million to write down goodwill, impacting income (loss) from operations, in addition to charges for write-downs of inventory and receivables and severance-related charges related to our Devices group within our E&P Optimization Operations segment.

	Years Ended		
	December 31,		
	2016	2015	2014
Depreciation and amortization (including multi-client data library):			
E&P Technology & Services	\$44,100	\$51,014	\$80,138
E&P Operations Optimization	1,780	2,869	2,849
Ocean Bottom Services	7,511	6,158	6,517
Support and other	1,919	2,270	2,526
Total	\$55,310	\$62,311	\$92,030

	December 31,	
	2016	2015
Total assets:		
E&P Technology & Services	\$159,965	\$243,067
E&P Operations Optimization	76,992	98,161
Ocean Bottom Services	29,908	35,792
Support and other	46,351	58,068
Total	\$313,216	\$435,088

A summary of total assets by geographic area follows (in thousands):

	December 31,	
	2016	2015
Total assets by geographic area:		
North America	\$145,013	\$225,847
Europe	61,329	84,392
Middle East	72,984	75,390
Latin America	23,891	35,349
Other	9,999	14,110
Total	\$313,216	\$435,088

Intersegment sales are insignificant for all periods presented. Support and other assets include all assets specifically related to support personnel and operation and a majority of cash and cash equivalents. Depreciation and amortization expense is allocated to segments based upon use of the underlying assets.

A summary of net revenues by geographic area follows (in thousands):

	Years Ended December 31,		
	2016	2015	2014
Net revenues by geographic area:			
Europe	\$41,674	\$72,577	\$100,188
Africa	41,417	13,182	75,507
North America	38,005	74,634	130,224
Latin America	24,090	16,406	111,078
Asia Pacific	16,226	19,135	49,881
Middle East	9,467	14,571	39,142
Commonwealth of Independent States	1,929	11,008	3,538
Total	\$172,808	\$221,513	\$509,558

Net revenues are attributed to geographic areas on the basis of the ultimate destination of the equipment or service, if known, or the geographic area imaging services are provided. If the ultimate destination of such equipment is not known, net revenues are attributed to the geographic area of initial shipment.

(4) Long-term Debt and Lease Obligations

Obligations (in thousands)	December 31,	
	2016	2015
Senior secured second-priority lien notes (maturing December 15, 2021)	\$ 120,569	\$—
Senior secured third-priority lien notes (maturing May 15, 2018)	28,497	175,000
Revolving credit facility	10,000	—
Equipment capital leases	3,446	9,762
Other debt	1,415	1,558
Costs associated with issuances of debt ⁽¹⁾	(5,137)	(3,328)
Total	158,790	182,992
Current portion of long-term debt and lease obligations	(14,581)	(7,912)
Non-current portion of long-term debt and lease obligations	\$ 144,209	\$ 175,080

(1) Represents debt issuance costs presented as a direct deduction from the carrying amount of the associated debt liability.

Revolving Credit Facility

In August 2014, ION and its material U.S. subsidiaries, ION Exploration Products (U.S.A.), Inc., I/O Marine Systems, Inc. and GX Technology Corporation (collectively, the “Subsidiary Borrowers”), and together with the Company, collectively, the “Borrowers”) entered into a Revolving Credit and Security Agreement with PNC Bank, National Association (“PNC”), as agent (the “Original Credit Agreement”), which was amended by the First Amendment to Revolving Credit and Security Agreement in August 2015 (the “First Amendment”) and the Second Amendment (as defined below) (the Original Credit Agreement, as amended by the First Amendment, and the Second Amendment, the “Credit Facility”).

On August 4, 2015, the Company and the Subsidiary Borrowers amended the terms of the Credit Facility pursuant to a First Amendment to Revolving Credit and Security Agreement dated effective as of August 4, 2015 (the “First Amendment”). The First Amendment contemplated, among other things, (i) PNC becoming the sole lender under the Credit Facility, (ii) the reduction of the maximum amount of the revolving line of credit under the Credit Facility from \$80.0 million to \$40.0 million, (iii) the elimination of the requirement that the Company not exceed a maximum senior secured leverage ratio, (iv) the amendment of the borrowing base formula under the Credit Facility and (v) the removal of the accordion features under the Credit Facility.

On April 28, 2016, the Borrowers and PNC entered into a second amendment (the “Second Amendment”) to the Credit Facility. The Second Amendment, among other things:

- increased the applicable margin for loans by 0.50% per annum (from 2.50% per annum to 3.00% per annum for alternate base rate loans and from 3.50% per annum to 4.00% per annum for LIBOR-based loans);
- increased the minimum excess availability threshold to avoid triggering the agent’s rights to exercise dominion over cash and deposit accounts and increases certain of the thresholds upon which such dominion ceases;
- increased the minimum liquidity threshold to avoid triggering the Company’s obligation to calculate and comply with the existing fixed charge coverage ratio and increased certain of the thresholds upon which such required calculation and compliance cease;
- established a reserve that reduced the amount available to be borrowed by the aggregate amount owing under all Third Lien Notes that remain outstanding (if any) on or after February 14, 2018 (i.e., 90 days prior to the stated maturity of the Third Lien Notes);
- increased the maximum amount of certain permitted junior indebtedness to \$200.0 million (from \$175.0 million);
- incorporated technical and conforming changes to reflect that the Second Lien Notes and the remaining Third Lien Notes (and any permitted refinancing thereof or subsequently incurred replacement indebtedness meeting certain requirements) constitute permitted indebtedness;
- clarified the circumstances and mechanics under which the Company may prepay, repurchase or redeem the Second Lien Notes, the remaining Third Lien Notes and certain other junior indebtedness;
-

modified the cross-default provisions to incorporated defaults under the Second Lien Notes, the remaining Third Lien Notes and certain other junior indebtedness; and

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eliminated the potential early commitment termination date and early maturity date that would otherwise have occurred ninety (90) days prior the maturity date of the Third Lien Notes if any of the Third Lien Notes then remained outstanding.

The borrowing base under the Credit Facility will increase or decrease monthly using a formula based on certain eligible receivables, eligible inventory and other amounts, including a percentage of the net orderly liquidation value of the Borrowers' multi-client data library (not to exceed \$15.0 million for the multi-client data library data component). As of December 31, 2016, the borrowing base under the Credit Facility was \$25.2 million, and there was \$10.0 million of indebtedness under the Credit Facility. The Credit Facility is scheduled to mature on August 22, 2019.

The obligations of Borrowers under the Credit Facility are secured by a first-priority security interest in 100% of the stock of the Subsidiary Borrowers and 65% of the equity interest in ION International Holdings L.P. and by substantially all other assets of the Borrowers.

The Credit Facility, as amended, contains covenants that, among other things, restrict the Company, subject to certain exceptions, from incurring additional indebtedness (including capital lease obligations), granting or incurring additional liens on the Company's properties, pledging shares of the Company's subsidiaries, entering into certain merger or other change-in-control transactions, entering into transactions with the Company's affiliates, making certain sales or other dispositions of the Company's assets, making certain investments, acquiring other businesses and entering into sale-leaseback transactions with respect to the Company's property.

In addition, the terms of our Credit Facility contain covenants that restrict the Company from paying cash dividends on its common stock, or repurchasing or acquiring shares of its common stock, unless (i) there is no event of default under the Credit Facility, (ii) there is excess availability under the Credit Facility greater than \$20.0 million (or, at the time that the borrowing base formula amount is less than \$20.0 million, the borrowers' level of liquidity (as defined in the revolving credit and security agreement) is greater than \$20.0 million) and (iii) the agent receives satisfactory projections showing that excess availability under the Credit Facility for the immediately following period of ninety (90) consecutive days will not be less than \$20.0 million (or, at the time that the borrowing base formula amount is less than \$20.0 million, the borrowers' level of liquidity is greater than \$20.0 million). The aggregate amount of permitted cash dividends and stock repurchases may not exceed \$10.0 million in any fiscal year or \$40.0 million in the aggregate from and after the closing date of the Credit Facility.

The Credit Facility, requires that ION and the Subsidiary Borrowers maintain a minimum fixed charge coverage ratio of 1.1 to 1.0 as of the end of each fiscal quarter during the existence of a covenant testing trigger event. The fixed charge coverage ratio is defined as the ratio of (i) ION's EBITDA, minus unfunded capital expenditures made during the relevant period, minus distributions (including tax distributions) and dividends made during the relevant period, minus cash taxes paid during the relevant period, to (ii) certain debt payments made during the relevant period. A covenant testing trigger event occurs upon (a) the occurrence and continuance of an event of default under the Credit Facility or (b) the failure to maintain a measure of liquidity greater than (i) \$7.5 million for five consecutive business days or (ii) \$6.5 million on any given business day. Liquidity, as defined in the Credit Facility, is the Company's excess availability to borrow (\$15.2 million at December 31, 2016) plus the aggregate amount of unrestricted cash held by ION, the Subsidiary Borrowers and their domestic subsidiaries.

At December 31, 2016 the Company was in compliance with all of the covenants under the Credit Facility.

The Credit Facility, as amended, contains customary event of default provisions (including a "change of control" event affecting ION), the occurrence of which could lead to an acceleration of the Company's obligations under the Credit Facility as amended.

Senior Secured Notes

In May 2013, the Company sold \$175.0 million aggregate principal amount of 8.125% Senior Secured Second-Priority Notes due 2018 (the "Third Lien Notes") in a private offering pursuant to an Indenture dated as of May 13, 2013 (the Third Lien Notes Indenture"). Prior to the completion of the Exchange Offer (as defined below) and Consent Solicitation (as defined below) on April 28, 2016, the Third Lien Notes were senior secured second-priority obligations of the Company. After giving effect to the Exchange Offer and Consent Solicitation, the remaining aggregate principal amount of approximately \$28.5 million of outstanding Third Lien Notes became senior secured

third-priority obligations of the Company subordinated to the liens securing all senior and second priority indebtedness of the Company, including under the Credit Facility and Second-Priority Lien Notes (defined below).

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Pursuant to the Exchange Offer and Consent Solicitation, the Company (i) issued approximately \$120.6 million in aggregate principal amount of the Company’s new 9.125% Senior Secured Second Priority Notes due 2021 (the “Second Lien Notes,” and collectively with the Third Lien Notes, the “Notes”) and 1,205,477 shares of the Company’s common stock in exchange for approximately \$120.6 million in aggregate principal amount of Third Lien Notes, and (ii) purchased approximately \$25.9 million in aggregate principal amount of Third Lien Notes in exchange for aggregate cash consideration totaling approximately \$15.0 million, plus accrued and unpaid interest on the Third Lien Notes from the applicable last interest payment date to, but not including, April 28, 2016.

After giving effect to the Exchange Offer and Consent Solicitation, the aggregate principal amount of the Third Lien Notes remaining outstanding was approximately \$28.5 million and the aggregate principal amount of Second Lien Notes outstanding was approximately \$120.6 million. See “Exchange Offer” below.

The Third Lien Notes are guaranteed by the Company’s material U.S. subsidiaries, GX Technology Corporation, ION Exploration Products (U.S.A.), Inc. and I/O Marine Systems, Inc. (the “Guarantors”), and mature on May 15, 2018. Interest on the Third Lien Notes accrues at the rate of 8.125% per annum and will be payable semiannually in arrears on May 15 and November 15 of each year during their term.

Prior to the completion of the Exchange Offer and Consent Solicitation, the Third Lien Notes Indenture contained certain covenants that, among other things, limited or prohibited the Company’s ability and the ability of its restricted subsidiaries to take certain actions or permit certain conditions to exist during the term of the Third Lien Notes, including among other things, incurring additional indebtedness, creating liens, paying dividends and making other distributions in respect of the Company’s capital stock, redeeming the Company’s capital stock, making investments or certain other restricted payments, selling certain kinds of assets, entering into transactions with affiliates, and effecting mergers or consolidations. These and other restrictive covenants contained in the Third Lien Notes Indenture are subject to certain exceptions and qualifications. After giving effect to the Exchange Offer and Consent Solicitation, the Third Lien Notes Indenture was amended to, among other things, provide for the release of the second priority security interest in the collateral securing the remaining Third Lien Notes and the grant of a third priority security interest in the collateral, subordinate to liens securing all senior and second priority indebtedness of the Company, including the Credit Facility and the Second Lien Notes, and eliminate substantially all of the restrictive covenants and certain events of default pertaining to the remaining Third Lien Notes.

As of December 31, 2016, the Company was in compliance with the covenants with respect to the Third Lien Notes. On or after May 15, 2015, the Company may on one or more occasions redeem all or a part of the Third Lien Notes at the redemption prices set forth below, plus accrued and unpaid interest and special interest, if any, on the Third Lien Notes redeemed during the twelve-month period beginning on May 15th of the years indicated below:

Date	Percentage
2015	104.063%
2016	102.031%
2017 and thereafter	100.000%

The Second Lien Notes are senior secured second-priority obligations guaranteed by the Guarantors. The Second Lien Notes mature on December 15, 2021. Interest on the Second Lien Notes accrues at the rate of 9.125% per annum and is payable semiannually in arrears on June 15 and December 15 of each year during their term, beginning June 15, 2016, except that the interest payment otherwise payable on June 15, 2021 will be payable on December 15, 2021. The indenture dated April 28, 2016 governing the Second Lien Notes (the “Second Lien Notes Indenture”) contains certain covenants that, among other things, limits or prohibits the Company’s ability and the ability of its restricted subsidiaries to take certain actions or permit certain conditions to exist during the term of the Second Lien Notes, including among other things, incurring additional indebtedness, creating liens, paying dividends and making other distributions in respect of the Company’s capital stock, redeeming the Company’s capital stock, making investments or certain other restricted payments, selling certain kinds of assets, entering into transactions with affiliates, and effecting mergers or consolidations. These and other restrictive covenants contained in the Second Lien Notes Indenture are subject to certain exceptions and qualifications. All of the Company’s subsidiaries are currently restricted subsidiaries. As of December 31, 2016, the Company was in compliance with the covenants with respect to the Second Lien Notes.

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On or after December 15, 2019, the Company may on one or more occasions redeem all or a part of the Second Lien Notes at the redemption prices set forth below, plus accrued and unpaid interest and special interest, if any, on the Second Lien Notes redeemed during the twelve-month period beginning on December 15th of the years indicated below:

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Date	Percentage
2019	105.500%
2020	103.500%
2021 and thereafter	100.000%

Exchange Offer

On April 28, 2016, the Company successfully completed the previously announced exchange offer (the “Exchange Offer”) and consent solicitation (the “Consent Solicitation”) related to the Third Lien Notes. The Company did not receive any cash proceeds in connection with the Exchange Offer and Consent Solicitation.

Under the terms of the Exchange Offer, for each \$1,000 principal amount of Third Lien Notes validly tendered for exchange and not validly withdrawn by an eligible holder (an “Exchange Participant”) prior to 11:59 P.M., New York City time, on April 25, 2016, and accepted for exchange by the Company, the Company offered the consideration (the “Exchange Consideration”) of (i) \$1,000 principal amount of Second Lien Notes plus (ii) either (a) for Third Lien Notes tendered at or prior to 4:59 P.M., New York City time, on April 15, 2016 (the “Extended Early Tender Deadline”), ten (10) shares of the Company’s common stock (the “Early Stock Consideration”), or (b) for Third Lien Notes tendered after the Extended Early Tender Deadline, seven (7) shares of the Company’s common stock (the “Stock Consideration”) (such shares issued as the Early Stock Consideration or the Stock Consideration, together with the Second Lien Notes, the “Exchange Securities”), upon the terms and subject to the conditions set forth in the Company’s confidential Offer to Exchange and related Consent and Letter of Transmittal, each dated March 28, 2016 (the “Offer Documents”).

As part of the Exchange Offer, each Exchange Participant had the opportunity to tender all or a portion of its Third Lien Notes for a cash payment in lieu of the Exchange Consideration upon the terms and subject to the conditions set forth in the Offer Documents (the “Cash Tender Option”). The aggregate amount of cash consideration that could be paid by the Company for tendered Third Lien Notes accepted for purchase pursuant to the Cash Tender Option was approximately \$15.0 million plus accrued and unpaid interest to, but not including, the settlement date of the Exchange Offer (collectively, the “Cash Tender Cap”).

Concurrently with the Exchange Offer, the Company solicited consents from eligible holders to proposed amendments to the Third Lien Notes Indenture (the “Proposed Amendments”). The Proposed Amendments, among other things, provide for the release of the second priority security interest in the collateral securing the Third Lien Notes and the grant of a third priority security interest in the collateral, subordinate to liens securing all the Company’s senior and second priority indebtedness, including the Credit Facility and the Second Lien Notes, and eliminate substantially all of the restrictive covenants and certain events of default pertaining to the Third Lien Notes.

The Exchange Offer, including the Cash Tender Option, and the Consent Solicitation expired at 11:59 P.M., New York City time, on April 28, 2016. In total, the Company accepted for exchange approximately \$146.5 million in aggregate principal amount of the Third Lien Notes, or approximately 83.72% of the \$175 million outstanding aggregate principal amount of the Third Lien Notes, validly tendered and not withdrawn in the Exchange Offer. The Third Lien Notes validly tendered and not withdrawn in the Exchange Offer were accepted by the Company.

Because the Company received the necessary consents to effect the Proposed Amendments, any Third Lien Notes not validly tendered pursuant to the Exchange Offer remain outstanding and the holders are subject to the terms of the supplemental indenture implementing the Proposed Amendments. No consideration was paid to holders of Third Lien Notes in connection with the Consent Solicitation. After giving effect to the Exchange Offer and Consent Solicitation, the aggregate principal amount of the Third Lien Notes remaining outstanding was approximately \$28.5 million as of April 25, 2016, and such Third Lien Notes are secured on a third priority basis subordinated to the liens securing all senior and second priority indebtedness of the Company, including under the Credit Facility and Second Lien Notes. In exchange for approximately \$120.6 million in aggregate principal amount of Third Lien Notes, the Company issued approximately \$120.6 million aggregate principal amount of Second Lien Notes and 1,205,477 shares of common stock, including 1,204,980 shares issued as Early Stock Consideration and 497 shares issued as Stock Consideration. The Company utilized 508,464 of treasury shares towards the total 1,205,477 shares issued. The securities issued in the Exchange Offer were issued in reliance on an exemption from registration set forth in Section 4(a)(2) of the

Securities Act. The Company received no cash consideration in exchange for the issuance of the Exchange Securities. The Cash Tender Option was fully subscribed. Pursuant to the terms of the Exchange Offer, the Company accepted for purchase tendered Third Lien Notes at the lowest bid prices until the Cash Tender Cap was reached, subject to proration. In exchange for aggregate cash consideration totaling approximately \$15.0 million, the Company purchased approximately \$25.9 million in aggregate principal amount of Third Lien Notes. The Company also paid in cash accrued and unpaid interest on Third

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Lien Notes accepted for purchase in the Exchange Offer from the applicable last interest payment date to, but not including, April 28, 2016.

Equipment Capital Leases

The Company has entered into capital leases that are due in installments for the purpose of financing the purchase of computer equipment through 2019. Interest accrues under these leases at rates of up to 4.3% per annum, and the leases are collateralized by liens on the computer equipment. The assets are amortized over the lesser of their related lease terms or their estimated productive lives and such charges are reflected within depreciation expense.

A summary of future principal obligations under long-term debt and equipment capital lease obligations follows (in thousands):

Years Ended December 31,	Long-Term Debt	Capital Lease Obligations	Other Financing	Total
2017	\$ 10,000	\$ 3,166	\$ 1,415	\$14,581
2018	28,497	251	—	28,748
2019	—	29	—	29
2020	—	—	—	—
2021	120,569	—	—	120,569
Thereafter	—	—	—	—
Total	\$ 159,066	\$ 3,446	\$ 1,415	\$163,927

(5) Net Income (Loss) per Common Share

Basic net income (loss) per common share is computed by dividing net income (loss) applicable to common shares by the weighted average number of common shares outstanding during the period. Diluted net income (loss) per common share is determined based on the assumption that dilutive restricted stock and restricted stock unit awards have vested and outstanding dilutive stock options have been exercised and the aggregate proceeds were used to reacquire common stock using the average price of such common stock for the period. The total number of shares issuable under anti-dilutive options at December 31, 2016, 2015 and 2014 were 847,635, 560,797 and 599,068, respectively. All outstanding stock options for the twelve months ended December 31, 2016, 2015 and 2014 were anti-dilutive.

(6) Income Taxes

The sources of income (loss) before income taxes are as follows (in thousands):

	Years Ended December 31,		
	2016	2015	2014
Domestic	\$(41,246)	\$21,065	\$(162,151)
Foreign	(19,060)	(42,175)	55,215
Total	\$(60,306)	\$(21,110)	\$(106,936)

Components of income taxes are as follows (in thousands):

	Years Ended December 31,		
	2016	2015	2014
Current:			
Federal	\$—	\$(4,715)	\$(678)
State and local	28	41	(42)
Foreign	5,574	1,274	21,722
Deferred:			
Federal	—	2,726	1,004
Foreign	(1,181)	4,718	(1,424)
Total income tax expense	\$4,421	\$4,044	\$20,582

A reconciliation of the expected income tax expense on income (loss) before income taxes using the statutory federal income tax rate of 35% for 2016, 2015 and 2014 to income tax expense follows (in thousands):

	Years Ended December 31,		
	2016	2015	2014
Expected income tax expense at 35%	\$(21,107)	\$(7,389)	\$(37,428)
Foreign tax rate differential	5,932	1,769	(10,481)
Foreign tax differences	(4,828)	4,104	6,444
State and local taxes	28	41	(42)
Nondeductible expenses	(259)	578	(1,584)
Goodwill impairment	—	—	9,444
Expired Capital Loss	1,321	15,950	—
Valuation allowance:			
Valuation allowance on equity in losses of INOVA Geophysical	—	—	17,644
Valuation allowance on expiring capital losses	(1,321)	(15,950)	—
Valuation allowance on operations	24,655	4,941	36,585
Total income tax expense	\$4,421	\$4,044	\$20,582

The tax effects of the cumulative temporary differences resulting in the net deferred income tax asset (liability) are as follows (in thousands):

	December 31,	
	2016	2015
Non-current deferred:		
Deferred income tax assets:		
Accrued expenses	\$2,994	\$2,976
Allowance Accounts	4,861	6,739
Net operating loss carryforward	98,896	95,640
Capital loss carryforward	1,114	2,434
Equity method investment	58,820	58,820
Original issue discount	17,924	—
Basis in identified intangibles	15,286	5,978
Tax credit carryforwards	7,051	7,051
Contingency accrual	—	7,700
Other	10,755	12,138
Total non-current deferred income tax asset	217,701	199,476
Valuation allowance	(217,589)	(194,255)
Net non-current deferred income tax asset	112	5,221
Deferred income tax liabilities:		
Other	(1,240)	—
Unbilled receivables	(1,908)	(6,516)
Basis in property, plant and equipment	(531)	(3,439)
Total net non-current deferred income tax liability	\$(3,567)	\$(4,734)

During 2013 the Company established a valuation allowance on the substantial majority of U.S. net deferred tax assets due to the significant charges taken during the year and the related inability to rely on projections of future income. As of December 31, 2016, the Company has a full valuation allowance on all net U.S. deferred tax assets. The valuation allowance was calculated in accordance with the provisions of ASC 740-10, "Accounting for Income Taxes," which requires that a valuation allowance be established or maintained when it is "more likely than not" that all or a portion of deferred tax assets will not be realized. The Company will continue to record a valuation allowance for the substantial majority of its deferred tax assets until there is sufficient evidence to warrant reversal.

At December 31, 2016, the Company had U.S. net operating loss carryforwards of approximately \$217.6 million, expiring in 2034, and net operating loss carryforwards outside of the U.S. of approximately \$97.1 million, the majority of which expires beyond 2027. At December 31, 2016, the Company also had \$3.2 million of U.S. capital loss carryforwards. The majority of these capital loss carryforwards expire in 2017.

As of December 31, 2016, the Company has approximately \$1.3 million of unrecognized tax benefits and does not expect to recognize any significant increases in unrecognized tax benefits during the next twelve-month period. Interest and penalties, if any, related to unrecognized tax benefits are recorded in income tax expense. During 2016, 2015 and 2014, the aggregate changes in the Company's total gross amount of unrecognized tax benefits are summarized as follows (in thousands):

	Years Ended December 31,		
	2016	2015	2014
Beginning balance	\$1,250	\$1,957	\$2,219
Increases in unrecognized tax benefits – prior year positions	—	—	—
Increases in unrecognized tax benefits – current year positions	49	75	263
Decreases in unrecognized tax benefits – prior year position	—	(782)	(525)
Ending balance	\$1,299	\$1,250	\$1,957

The Company's U.S. federal tax returns for 2013 and subsequent years remain subject to examination by tax authorities. The Company is no longer subject to IRS examination for periods prior to 2012, although carryforward attributes that were generated prior to 2012 may still be adjusted upon examination by the IRS if they either have been or will be used in a future period. In the Company's foreign tax jurisdictions, tax returns for 2011 and subsequent years generally remain open to examination.

As of December 31, 2016, the Company considered the outside book-over-tax basis difference in its foreign subsidiaries to be in the amount of approximately \$86.3 million. United States income taxes have not been provided on this difference as it is the Company's intention to reinvest the undistributed earnings of its foreign subsidiaries indefinitely. The Company's U.S. operations are expected to be fully supported by existing cash balances and U.S.-generated cash flows. These foreign earnings could become subject to additional tax if remitted, or deemed remitted, to the United States as a dividend; however, it is not practicable to estimate the additional amount of taxes payable.

(7) Legal Matters

WesternGeco

In June 2009, WesternGeco L.L.C. ("WesternGeco") filed a lawsuit against the Company in the United States District Court for the Southern District of Texas, Houston Division. In the lawsuit, styled WesternGeco L.L.C. v. ION Geophysical Corporation, WesternGeco alleged that the Company had infringed several method and apparatus claims contained in four of its United States patents regarding marine seismic streamer steering devices.

The trial began in July 2012. A verdict was returned by the jury in August 2012, finding that the Company infringed the claims contained in the four patents by supplying its DigiFIN® lateral streamer control units and the related software from the United States and awarded WesternGeco the sum of \$105.9 million in damages, consisting of \$12.5 million in reasonable royalty and \$93.4 million in lost profits.

In June 2013, the presiding judge entered a Memorandum and Order, denying the Company's post-verdict motions that challenged the jury's infringement findings and damages amount. In the Memorandum and Order, the judge also stated that WesternGeco is entitled to be awarded supplemental damages for the additional DigiFIN units that were supplied from the United States before and after trial that were not included in the jury verdict due to the timing of the trial. In October 2013, the judge entered another Memorandum and Order, ruling on the number of DigiFIN units that are subject to supplemental damages and also ruling that the supplemental damages applicable to the additional units should be calculated by adding together the jury's previous reasonable royalty and lost profits damages awards per unit, resulting in supplemental damages of \$73.1 million.

In April 2014, the judge entered another Order, ruling that lost profits should not have been included in the calculation of supplemental damages in the October 2013 Memorandum and Order and reducing the supplemental damages award in the case from \$73.1 million to \$9.4 million. In the Order, the judge also further reduced the damages award in the case by \$3.0 million to reflect a settlement and license that WesternGeco entered into with a customer of the Company that had purchased and used DigiFIN units that were also included in the damage amounts awarded against the Company.

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In May 2014, the judge signed and entered a Final Judgment in the amount of \$123.8 million. Also, the Final Judgment included an injunction that enjoins the Company, its agents and anyone acting in concert with it, from supplying in or from the United States the DigiFIN product or any parts unique to the DigiFIN product, or any instrumentality no more than colorably different from any of these products or parts, for combination outside of the United States. The Company has conducted its business in compliance with the District Court's orders in the case, and the Company has reorganized its operations such that it no longer supplies the DigiFIN product or any parts unique to the DigiFIN product in or from the United States.

The Company and WesternGeco each appealed the Final Judgment to the United States Court of Appeals for the Federal Circuit in Washington, D.C. On July 2, 2015, the Court of Appeals reversed in part the Final Judgment, holding the District Court erred by including lost profits in the Final Judgment. Lost profits were \$93.4 million and prejudgment interest on the lost profits was approximately \$10.9 million of the \$123.8 million Final Judgment. Pre-judgment interest on the lost profits portion will be treated in the same way as the lost profits. Post-judgment interest will likewise be treated in the same fashion. On July 29, 2015, WesternGeco filed a petition for rehearing en banc before the Court of Appeals. On October 30, 2015, the Court of Appeals denied WesternGeco's petition for rehearing en banc.

In February 26, 2016, WesternGeco filed a petition for writ of certiorari by the Supreme Court. The Company filed its response on April 27, 2016. Subsequently, on June 20, 2016, the Supreme Court refused to disturb the Court of Appeals ruling finding no lost profits as a matter of law. Separately, in light of the changes in case law regarding the standard of proof for willfulness in the Halo and Stryker cases, the Supreme Court indicated that the case should be remanded to the Federal Circuit for a determination of whether or not the willfulness determination by the District Court was appropriate.

On October 14, 2016, the United States Court of Appeals for the Federal Circuit issued a mandate returning the case to the District Court for consideration of whether or not additional damages for willfulness are appropriate. The Company will argue enhancement is not proper here under the new law, just as it was not under prior law, but in any event should be based on the royalty award, not the award plus interest.

On November 14, 2016, the District Court issued an order reducing the amount of the appeal bond from \$120.0 million to \$65.0 million dollars, ordered the sureties to pay principal and interest on the royalty previously awarded and declined to issue a final judgment until after consideration of whether enhanced damages related to willfulness should be awarded in the case. While the Company does not agree with the unusual decision by the District Court ordering payment of the royalty damages and interest without a final judgment, the Company paid the \$20.8 million due pursuant to the order to WesternGeco on November 25, 2016. The district court previously refused WesternGeco's request for additional damages for willfulness, but a change in the law in June 2016, permitted WesternGeco to renew its request, the Company has opposed WesternGeco's motion. WesternGeco has also filed a motion in the U.S. Supreme Court indicating it intends to appeal the lost profits again. The Company will oppose WesternGeco's second attempt to appeal to the Supreme Court matters it did not succeed on in its appeal last year (among other reasons). After issuance of a final judgement, we will decide whether or not to pursue available appeals regarding the decision. As previously disclosed, the Company had taken a loss contingency accrual of \$123.8 million. As a result of the reversal by the Court of Appeals, as of June 30, 2015, the Company reduced the loss contingency accrual to \$22.0 million. The District Court ordered payment of the royalty damages and interest without a final judgment and the Company paid the \$20.8 million due pursuant to the order to WesternGeco on November 25, 2016. After this payment the remaining \$1.1 million accrual was reversed to zero. Effective as of December 31, 2016, the Company no longer has a loss contingency associated with the WesternGeco litigation. The Company's assessment of its potential loss contingency and need for a loss contingency may change in the future due to developments in the case and other events, such as changes in applicable law or adverse order, and such reassessment could lead to the determination that a new loss contingency should be established up to approximately \$44.0 million. Any such reassessment could have a material effect on the Company's financial condition or results of operations.

Prior to the reduction in damages by the Court of Appeals, the Company arranged with sureties to post an appeal bond at the District Court. The appeal bond is uncollateralized, but the terms of the appeal bond arrangements provide the sureties the contractual right for as long as the bond is outstanding to require the Company to post cash collateral. In

light of the payment of the \$20.8 million in royalty damages by the Company, the sureties filed motions on December 30, 2016 to have the appeal bond dismissed.

Other

The Company has been named in various other lawsuits or threatened actions that are incidental to its ordinary business. Litigation is inherently unpredictable. Any claims against the Company, whether meritorious or not, could be time-consuming, cause the Company to incur costs and expenses, require significant amounts of management time and result in the diversion of significant operational resources. The results of these lawsuits and actions cannot be predicted with certainty. Management currently believes that the ultimate resolution of these matters will not have a material adverse impact on the financial condition, results of operations or liquidity of the Company.

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(8) Other Income

A summary of other income follows (in thousands):

	Years Ended December 31,		
	2016	2015	2014
Reduction of (accrual for) loss contingency related to legal proceedings (Footnote 7)	\$1,168	\$101,978	\$69,557
Gain on sale of a product line ⁽¹⁾	—	—	6,522
Gain on sale of cost method investments ⁽²⁾	—	—	5,463
Recovery of INOVA bad debts	3,983	—	—
Loss on bond exchange	(2,182)	—	—
Other income	(1,619)	(3,703)	(1,682)
Total other income	\$1,350	\$98,275	\$79,860

In 2014, the Company sold its Source product line for \$14.4 million, net of transaction fees, recording a gain of

⁽¹⁾ approximately \$6.5 million before taxes. The historical results of this product line have not been material to the Company's results of operations.

Includes the 2014 sale of the Company's cost method investment in a privately-owned U.S.-based technology

⁽²⁾ company for total proceeds of approximately \$16.5 million, of which \$14.1 million was due and paid at closing and the remainder in 2016.

(9) Details of Selected Balance Sheet Accounts

Accounts Receivable

A summary of accounts receivable follows (in thousands):

	December 31,	
	2016	2015
Accounts receivable, principally trade	\$22,214	\$49,284
Less allowance for doubtful accounts	(1,444)	(4,919)
Accounts receivable, net	\$20,770	\$44,365

Inventories

A summary of inventories follows (in thousands):

	December 31,	
	2016	2015
Raw materials and purchased subassemblies	\$21,454	\$34,949
Work-in-process	2,255	8,478
Finished goods	6,581	13,769
Reserve for excess and obsolete inventories	(15,049)	(24,475)
Total ^(a)	\$15,241	\$32,721

For 2016, inventories, net, decreased primarily due to the transfer of \$17.7 million of inventory to property, plant,

^(a)equipment and seismic rental equipment, net, primarily related to ocean bottom equipment to be used on future Ocean Bottom Services contracts.

The Company provides for estimated obsolescence or excess inventory in amounts equal to the difference between the cost of inventory and market based upon assumptions about future demand for the Company's products and market conditions and risk of obsolescence. In 2016, the reserve for excess and obsolete inventory decreased due to the transfer of reserved ocean bottom equipment inventory to be used in Ocean Bottom Services contracts, partially offset by the increase in the Company's reserve for excess and obsolete inventories by \$0.4 million.

Property, Plant, Equipment and Seismic Rental Equipment

A summary of property, plant, equipment and seismic rental equipment follows (in thousands):

	December 31,	
	2016	2015
Buildings	\$17,424	\$24,181
Machinery and equipment ^(a)	157,618	152,358
Seismic rental equipment	1,557	1,904
Furniture and fixtures	3,905	4,334
Other	30,049	31,821
Total	210,553	214,598
Less accumulated depreciation	(143,065)	(142,571)
Property, plant, equipment and seismic rental equipment, net	\$67,488	\$72,027

(a) In 2016, the company transferred \$17.7 million of Ocean Bottom equipment from inventory to machinery and equipment.

Total depreciation expense, including amortization of assets recorded under capital leases, for 2016, 2015 and 2014 was \$20.3 million, \$24.6 million and \$25.1 million, respectively.

Intangible Assets

	December 31, 2016		
	Gross Amount	Accumulated Amortization	Net
Customer relationships	\$36,934	\$ (33,831)	\$3,103
Total	\$36,934	\$ (33,831)	\$3,103

	December 31, 2015		
	Gross Amount	Accumulated Amortization	Net
Customer relationships	\$37,469	\$ (32,659)	\$4,810
Total	\$37,469	\$ (32,659)	\$4,810

Total amortization expense for intangible assets for 2016, 2015 and 2014 was \$1.7 million, \$1.9 million and \$2.5 million, respectively. A summary of the estimated amortization expense for the next three years follows (in thousands):

Years Ended December 31,	
2017	\$1,436
2018	\$1,169
2019	\$498

Accrued Expenses

	December 31,	
	2016	2015
Compensation, including compensation-related taxes and commissions	\$14,935	\$19,126
Accrued multi-client data library acquisition costs	567	1,600
Income tax payable	1,306	—
Other	9,432	13,561
Total	\$26,240	\$34,287

Other Long-term Liabilities

A summary of other long-term liabilities follows (in thousands):	December 31,	
	2016	2015
Accrual for loss contingency related to legal proceedings (Footnote 7)	\$—	\$22,000
Deferred lease liabilities	13,955	13,394
Facility restructuring accrual	1,765	3,006
Deferred income tax liability	3,679	4,734
Other	1,128	1,231
Total	\$20,527	\$44,365

(10) Goodwill

On December 31, 2016, the Company completed the annual reviews of the carrying value of goodwill in its E&P Technology and Services and Optimization Software & Services reporting units and noted no impairments. The qualitative assessment concluded it was more likely than not that the fair values of the Company's E&P Technology & Services, and Optimization Software & Services reporting units exceeded their carrying values.

In 2014, the Company recorded an impairment charge of \$21.9 million related to its goodwill in its Devices reporting unit. For goodwill testing purposes, the litigation contingency accrual of \$123.8 million as of December 31, 2014 was assigned to this reporting unit. Based on this accrual and the recording of a valuation allowance on substantially all of the Company's net deferred tax assets, this reporting unit's carrying value was negative as of December 31, 2014. The negative carrying value required the Company to perform step 2 of the impairment test on Devices; the test determined that the goodwill associated with the Devices reporting unit was impaired. The Company also recorded a \$1.4 million impairment of certain intangible assets related to customer relationship within the E&P Technology & Services segment at December 31, 2014.

The following is a summary of the changes in the carrying amount of goodwill for the years ended December 31, 2016 and 2015 (in thousands):

	E&P Technology & Services	Optimization Software & Services	Total
Balance at January 1, 2015	\$ 2,943	\$ 24,445	\$27,388
Impact of foreign currency translation adjustments	—	(1,114)	(1,114)
Balance at December 31, 2015	2,943	23,331	26,274
Impact of foreign currency translation adjustments	—	(4,066)	(4,066)
Balance at December 31, 2016	\$ 2,943	\$ 19,265	\$22,208

(11) Stockholders' Equity and Stock-based Compensation

Stock Option Plans

The Company has adopted stock option plans for eligible employees, directors and consultants, which provide for the granting of options to purchase shares of common stock. As of December 31, 2016, there were 847,635 outstanding options under the Company's stock option plans, and 599,720 shares available for future grant and issuance. The option and share numbers have been retroactively adjusted to reflect the one-for-fifteen reverse stock split completed on February 4, 2016.

The options under these plans generally vest in equal annual installments over a four-year period and have a term of ten years. These options are typically granted with an exercise price per share equal to or greater than the current market price and, upon exercise, are issued from the Company's unissued common shares. In August 2006, the Compensation Committee of the Board of Directors of the Company approved fixed pre-established quarterly grant dates for all future grants of options.

At-The-Market Equity Offering Program

On December 22, 2016 the Company announced that it has filed a prospectus supplement under which it may sell up to \$20.0 million of its common stock through an "at-the-market" equity offering program (the "ATM Program"). ION intends to use the net proceeds from sales under the ATM Program for general corporate purposes. The timing of any sales will depend on a variety of factors to be determined by ION. As of December 31, 2016, no shares were sold

under the program.

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Stock Repurchase Program

On November 4, 2015, the Company's board of directors approved a stock repurchase program authorizing a Company stock repurchase, from time to time from November 10, 2015 through November 10, 2017, up to \$25 million in shares of the Company's outstanding common stock. The stock repurchase program may be implemented through open market repurchases or privately negotiated transactions, at management's discretion. The actual timing, number and value of shares repurchased under the program will be determined by management at its discretion and will depend on a number of factors including the market price of the shares of our common stock and general market and economic conditions, applicable legal requirements and compliance with the terms of our outstanding indebtedness. The repurchase program does not obligate the Company to acquire any particular amount of common stock and may be modified or suspended at any time and could be terminated prior to completion. As of December 31, 2016, the Company was authorized to repurchase up to \$25 million through November 17, 2017 and had repurchased \$3 million or 451,792 shares of its common stock under the repurchase program at an average price per share of \$6.41. The number of shares repurchased and the average price per repurchased share has been retroactively adjusted to reflect the one-for-fifteen reverse stock split completed on February 4, 2016.

Reverse Stock Split and Increase in Authorized Shares

On February 1, 2016, the Company's stockholders approved an increase in the number of authorized shares of common stock from 200 million to 400 million, or 13.3 million to 26.7 million retroactively adjusted to reflect the one-for-fifteen reverse stock split.

On February 4, 2016, the Company completed a one-for-fifteen reverse stock split, and the Company's common stock began trading on a reverse-split adjusted basis on February 5, 2016. On February 5, 2016, the closing sale price for the Company's common stock was \$6.21 on the NYSE. All numbers of shares of common stock and per share common stock data in the accompanying consolidated financial statements and related notes have been retroactively adjusted to reflect this stock split for all periods presented. Unless otherwise noted, all numbers of shares of preferred stock and per share preferred stock data in the accompanying consolidated financial statements and related notes are not adjusted to reflect the stock split of our common stock.

As a result of the reverse stock split, the number of issued and outstanding shares was adjusted and the number of shares underlying outstanding stock options and the related exercise prices were adjusted. Following the effective date of the reverse stock split, the par value of the Company's common stock remained at \$0.01 per share, and the number of authorized shares was reduced from 400,000,000 to 26,666,667, adjusted to reflect a one-for-fifteen reverse stock split. The prices and share, restricted and option figures presented in the table below have been retroactively adjusted to reflect the one-for-fifteen reverse stock split completed on February 4, 2016.

Transactions under the stock option plans are summarized as follows:

	Option Price per Share	Outstanding	Vested	Available for Grant
January 1, 2014	\$42.45-\$245.85	550,567	305,698	334,762
Plan Expiration	—	—	—	(4,452)
Granted	37.05-62.55	115,760	—	(115,760)
Vested	—	—	92,750	—
Exercised	45	(1,900)	(1,900)	—
Cancelled/forfeited	45.00-231.45	(65,358)	(38,158)	14,453
Restricted stock granted out of option plans	—	—	—	(48,503)
Restricted stock forfeited or cancelled for employee minimum income taxes and returned to the plans	—	—	—	2,968
December 31, 2014	37.05-245.85	599,069	358,390	183,468
Granted	34.2	53,328	—	(53,328)
Vested	—	—	79,779	—
Exercised	—	—	—	—
Cancelled/forfeited	37.05-231.45	(91,600)	(53,864)	12,358
Restricted stock granted out of option plans	—	—	—	(45,652)
Restricted stock forfeited or cancelled for employee minimum income taxes and returned to the plans	—	—	—	157
December 31, 2015	34.20-245.85	560,797	384,305	97,003
Increase in shares authorized	—	—	—	1,150,940
Granted	3.1	415,000	—	(415,000)
Vested	—	—	67,480	—
Exercised	—	—	—	—
Cancelled/forfeited	3.1-245.85	(128,162)	(103,432)	18,895
Restricted stock granted out of option plans	—	—	—	(259,300)
Restricted stock forfeited or cancelled for employee minimum income taxes and returned to the plans	—	—	—	7,182
December 31, 2016	\$3.1-\$245.85	847,635	348,353	599,720

Stock options outstanding at December 31, 2016 are summarized as follows:

Option Price per Share	Outstanding	Weighted Average Exercise Price of Outstanding Options	Weighted Average Remaining Contract Life	Vested	Weighted Average Exercise Price of Vested Options
\$3.10 - \$57.90	557,438	\$ 15.00	6.9 years	94,050	\$ 50.09
\$61.05 - \$71.85	79,230	\$ 62.12	6.7 years	45,154	\$ 62.88
\$81.60 - \$99.60	119,296	\$ 88.73	5.5 years	117,478	\$ 88.61
\$106.05 - \$245.85	91,671	\$ 166.89	3.1 years	91,671	\$ 166.89
Totals	847,635	\$ 46.21	6.1 years	348,353	\$ 95.48

Additional information related to the Company's stock options follows:

	Number of Shares	Weighted Average Exercise Price	Weighted Average Grant Date Fair Value	Weighted Average Remaining Contractual Life	Aggregate Intrinsic Value (000's)
Total outstanding at January 1, 2016	560,797	\$ 89.74		6.0 years	
Options granted	415,000	\$ 3.10	\$ 2.04		
Options exercised	—	\$ —			
Options cancelled	(24,730)	\$ 37.68			
Options forfeited	(103,432)	\$ 111.34			
Total outstanding at December 31, 2016	847,635	\$ 46.21		6.1 years	\$ 1,175
Options exercisable and vested at December 31, 2016	348,353	\$ 95.48		5.8 years	\$ —

The total intrinsic value of options exercised during 2016, 2015 and 2014 was less than \$0.1 million, \$0.1 million and \$0.1 million, respectively. During 2016 and 2015 there was no cash received from option exercises under all share-based payment arrangements, and the Company received \$0.1 million, in 2014. The weighted average grant date fair value for stock option awards granted during 2016, 2015 and 2014 was \$2.04, \$16.65 and \$36.15 per share, respectively.

Restricted Stock and Restricted Stock Unit Plans

The Company has issued restricted stock and restricted stock units under the Company's 2013 Long-Term Incentive Plan and other applicable plans. Restricted stock units are awards that obligate the Company to issue a specific number of shares of common stock in the future if continued service vesting requirements are met. Non-forfeitable ownership of the common stock will vest over a period as determined by the Company in its sole discretion, generally in equal annual installments over a three-year period. Shares of restricted stock awarded may not be sold, assigned, transferred, pledged or otherwise encumbered by the grantee during the vesting period.

The status of the Company's restricted stock and restricted stock unit awards for 2016 follows:

	Number of Shares/Units
Total nonvested at January 1, 2016	73,627
Granted	259,300
Vested	(40,421)
Forfeited	(7,198)
Total nonvested at December 31, 2016	285,308

At December 31, 2016, the intrinsic value of restricted stock and restricted stock unit awards was approximately \$1.7 million. The weighted average grant date fair value for restricted stock and restricted stock unit awards granted during 2016, 2015 and 2014 was \$3.81, \$34.20 and \$59.70 per share, respectively. The total fair value of shares vested during 2016, 2015 and 2014 was \$0.2 million, \$0.6 million and \$2.1 million, respectively.

Employee Stock Purchase Plan

Effective February, 2016, the Company terminated its Employee Stock Purchase Plan ("ESPP") that had been in place since June 2010. The ESPP allowed all eligible employees to authorize payroll deductions at a rate of 1% to 10% of base compensation (or a fixed amount per pay period) for the purchase of the Company's common stock. Each participant was limited to purchase no more than 33 shares per offering period or 66 shares annually. Additionally, no participant may purchase shares in any calendar year that exceeded \$10,000 in fair market value based on the fair market value of the stock on the offering commencement date. The purchase price of the common stock was the lesser of 85% of the closing price on the first day of the applicable offering period (or most recently preceding trading day) or 85% of the closing price on the last day of the offering period (or most recently preceding trading day). Each

offering period is six months and commences on February 1 and August 1 of each year. The ESPP was considered a compensatory plan under ASC 718, and the Company recorded compensation expense of approximately \$0.1 million and \$0.2 million during 2015 and 2014, respectively. The expense represents the estimated fair value of the look-back purchase option. The fair value was determined using the Black-Scholes option pricing model and was recognized over the purchase period.

Stock Appreciation Rights Plan

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The Company has adopted a stock appreciation rights plan which provides for the award of stock appreciation rights (“SARs”) to directors and selected key employees and consultants. The awards under this plan are subject to the terms and conditions set forth in agreements between the Company and the holders. The exercise price per SAR is not to be less than one hundred percent of the fair market value of a share of common stock on the date of grant of the SAR. The term of each SAR shall not exceed ten years from the grant date. Upon exercise of a SAR, the holder shall receive a cash payment in an amount equal to the spread specified in the SAR agreement for which the SAR is being exercised. In no event will any shares of common stock be issued, transferred or otherwise distributed under the plan. On March 1, 2016, the Company issued 1,210,000 Stock Appreciation Rights (“SARs”) awards to 15 selected key employees with an exercise price of \$3.10. None of these SARs were awarded to non-employee directors. The vesting of these SARs is achieved through both a market condition and a service condition. The market condition is achieved, in part or in full, in the event that during the four-year period beginning on the date of grant the 20-day trailing volume-weighted average price of a share of common stock is (i) greater than 120% of the exercise price for the first 1/3 of the awards, (ii) greater than 125% of the exercise price for the second 1/3 of the awards and (iii) greater than 130% of the exercise price for the final 1/3 of the awards. The exercise condition restricts the ability of the holders to exercise awards until certain service milestones have been reached such that (i) no more than 1/3 of the awards may be exercised, if vested, on and after the first anniversary of the date of grant, (ii) no more than 2/3 of the awards may be exercised, if vested, on and after the second anniversary of the date of grant and (iii) all of the awards may be exercised, if vested, on and after the third anniversary of the date of grant. Pursuant to ASC 718, the stock appreciation rights are considered liability awards and as such, these amounts are accrued in the liability section of the balance sheet. The Company calculated the fair value of each SAR award on the date of grant using a Monte Carlo simulation model. The following assumptions were used:

December 31, 2016

Risk-free interest rates	1.81%
Expected lives (in years)	4.0
Expected dividend yield	—%
Expected volatility	70.99%

On March 1, 2015, the Company issued 207,207 SAR awards to 16 selected key employees with an exercise price of \$34.20. None of these SARs were awarded to non-employee directors. The SAR awards number and exercise price have been retroactively adjusted to reflect the one-for-fifteen reverse stock split completed on February 4, 2016. The vesting of these SARs is achieved through both a market condition and a service condition. The market condition is achieved, in part or in full, in the event that during the four-year period beginning on the date of grant the 20-day trailing volume-weighted average price of a share of common stock is (i) greater than 120% of the exercise price for the first 1/3 of the awards, (ii) greater than 125% of the exercise price for the second 1/3 of the awards and (iii) greater than 130% of the exercise price for the final 1/3 of the awards. The exercise condition restricts the ability of the holders to exercise awards until certain service milestones have been reached such that (i) no more than 1/3 of the awards may be exercised, if vested, on and after the first anniversary of the date of grant, (ii) no more than 2/3 of the awards may be exercised, if vested, on and after the second anniversary of the date of grant and (iii) all of the awards may be exercised, if vested, on and after the third anniversary of the date of grant.

Pursuant to ASC 718, “Compensation – Stock Compensation,” the stock appreciation rights are considered liability awards and as such, these amounts are accrued in the liability section of the balance sheet. The Company calculated the fair value of each SAR award on the date of grant using a Monte Carlo simulation model. The following assumptions were used:

December 31, 2015

Risk-free interest rates	2.19%
Expected lives (in years)	3.3
Expected dividend yield	—%
Expected volatility	69.38%

Additionally, as of December 31, 2016, the Company had outstanding 9,333 SAR awards to one individual with an exercise price of \$45.00. The Company recorded less than \$0.1 million, annually, of share-based compensation

expense during 2016, 2015 and 2014, related to employee stock appreciation rights. Pursuant to ASC 718, the stock appreciation rights are considered liability awards and as such, these amounts are accrued in the liability section of the balance sheet.

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Valuation Assumptions

The Company calculated the fair value of each stock option on the date of grant using the Black-Scholes option pricing model. The following assumptions were used for each respective period:

	Years Ended December 31,		
	2016	2015	2014
Risk-free interest rates	1.3%	1.38%	1.6% – 1.7%
Expected lives (in years)	5.5	4.5	5.5
Expected dividend yield	—%	—%	—%
Expected volatility	78.76%	59.32%	65.9% – 70.5%

The computation of expected volatility during 2016, 2015 and 2014 was based on an equally weighted combination of historical volatility and market-based implied volatility. Historical volatility was calculated from historical data for a period of time approximately equal to the expected term of the option award, starting from the date of grant.

Market-based implied volatility was derived from traded options on the Company's common stock having a term of six months. The Company's computation of expected life in 2016, 2015 and 2014 was determined based on historical experience of similar awards, giving consideration to the contractual terms of the stock-based awards, vesting schedules and expectations of future employee behavior. The risk-free interest rate assumption is based upon the U.S. Treasury yield curve in effect at the time of grant for periods corresponding with the expected life of the option.

Stock-based Compensation Expense

The following table summarizes stock-based compensation expense for the years ended December 31, 2016, 2015 and 2014 as follows (in thousands):

	Years Ended December 31,		
	2016	2015	2014
Stock-based compensation expense	\$3,267	\$5,486	\$8,707
Tax benefit related thereto	(1,168)	(1,826)	(2,908)
Stock-based compensation expense, net of tax	\$2,099	\$3,660	\$5,799

(12) Supplemental Cash Flow Information and Non-Cash Activity

Supplemental disclosure of cash flow information follows (in thousands):

	Years Ended December 31,		
	2016	2015	2014
Cash paid during the period for:			
Interest	\$15,691	\$15,441	\$16,582
Income taxes	4,474	8,163	16,124
Non-cash items from investing and financing activities:			
Purchase of computer equipment financed through capital leases	—	1,178	12,153
Leasehold improvement paid by landlord	955	—	—
Conversion of the Company's investment in a convertible note to equity	—	—	3,151
Issuance of stock in bond exchange	10,741	—	—
Transfer of inventory to property, plant and equipment	17,662	(a)15,936	(b)10,149
Investment in multi-client data library financed through trade payables	—	8,939	—
Purchases of property, plant, and equipment and seismic rental equipment financed through accounts payable	—	—	472

This transfer of \$17.7 million of inventory to property, plant, equipment and seismic rental equipment in December

(a) 2016, relates to ocean bottom seismic equipment manufactured by the Company to be deployed in the acquisition of ocean bottom seismic data.

This transfer of inventory to property, plant, equipment and seismic rental equipment relates to ocean bottom seismic equipment manufactured by the Company to be deployed in the acquisition of ocean bottom seismic data.

(b) During the twelve months ended December 31, 2015, the Company purchased approximately \$19.2 million of property, plant, equipment and seismic rental equipment, including approximately \$15.3 million related to the manufacture of ocean bottom seismic equipment that will be used by the Ocean Bottom Services segment.

(13) Operating Leases

Lessee. The Company leases certain equipment, offices and warehouse space under non-cancelable operating leases. Rental expense was \$11.3 million, \$11.8 million and \$12.9 million for 2016, 2015 and 2014, respectively.

A summary of future rental commitments over the next five years under non-cancelable operating leases follows (in thousands):

Years Ending December 31,	
2017	\$10,947
2018	9,676
2019	9,656
2020	9,832
2021	10,017
Total	\$50,128

On our existing OceanGeo vessel leases, our future commitments are di minimis if we do not re-charter the vessels for a future data survey.

(14) Acquisition of OceanGeo

Prior to 2014, the Company owned a 30% ownership interest in OceanGeo B.V. (“OceanGeo”). OceanGeo specializes in seismic acquisition operations using ocean bottom cables deployed from vessels leased by OceanGeo. To further assist OceanGeo in acquiring backlog, in October 2013, the Company also agreed to loan OceanGeo additional funds for working capital, as necessary, up to a maximum of \$25.0 million. Prior to obtaining a controlling interest in OceanGeo, the Company advanced a total of \$18.9 million to OceanGeo.

In January 2014, the Company acquired an additional 40% interest in OceanGeo, through the conversion of certain outstanding amounts loaned to OceanGeo by the Company into additional equity interests of OceanGeo, bringing the Company’s total equity interest in OceanGeo to 70% and giving the Company control over OceanGeo. The Company began including in its results of operations, the results of OceanGeo from the date of the Company’s acquisition of a controlling interest.

In July 2014, the Company acquired the remaining 30% of OceanGeo, increasing its equity interest in OceanGeo to 100%.

The Company acquired OceanGeo as part of its strategy to expand the range of service offerings it can provide to oil and gas exploration and production customers and to put its Calypso® ocean bottom seismic acquisition technology to work in a service model to meet the growing demand for ocean bottom seismic services.

The following summarized unaudited pro forma consolidated income statement information for 2014, assumes that the OceanGeo acquisition had occurred as of the beginning of the periods presented. The Company has prepared these unaudited pro forma financial results for comparative purposes only. These unaudited pro forma financial results may not be indicative of the results that would have occurred if the Company had completed the acquisition as of the beginning of the periods presented or the results that may be attained in the future. Amounts presented below are in thousands, except for the per share amounts:

	December
Pro forma Consolidated ION Income Statement Information (Unaudited)	31,
	2014
Net revenues	\$518,742
Loss from operations	\$(114,346)
Net loss	\$(126,492)
Net loss applicable to common shares	\$(127,226)
Basic and diluted net loss per common share	\$(11.70)

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(15) Equity Method Investments

The Company owns a 49% interest in a land seismic equipment business with BGP. BGP is a subsidiary of China National Petroleum Corporation (“CNPC”) and is a global geophysical services contracting company. The joint venture company, organized under the laws of the People’s Republic of China, is named INOVA Geophysical Equipment Limited (“INOVA Geophysical”). BGP owns the remaining 51% interest in INOVA Geophysical. INOVA Geophysical is managed through a Board of Directors consisting of four members appointed by BGP and three members appointed by the Company.

At December 31, 2014, the Company fully impaired its investment in INOVA as it determined that the decline in fair value below cost basis was other-than-temporary. This impairment was the result of the land seismic market having softened significantly due to reduced E&P company spending in the North American natural gas shale plays and reduced seismic activity in Russia and other regions due to lower crude oil prices. The Company recorded a charge of \$30.7 million, impairing its equity investment in INOVA and its share of INOVA’s accumulated other comprehensive loss, reducing both balances to zero. The Company accounts for its 49% interest in INOVA Geophysical as an equity method investment. As of December 31, 2016, the carrying value of this investment remains zero. The Company no longer records its equity in losses or earnings and has no obligation, implicit or explicit, to fund any expenses of INOVA Geophysical.

(16) Fair Value of Financial Instruments

Authoritative guidance on fair value measurements defines fair value, establishes a framework for measuring fair value and stipulates the related disclosure requirements. The Company follows a three-level hierarchy, prioritizing and defining the types of inputs used to measure fair value.

Due to their highly liquid nature, the amount of the Company’s other financial instruments, including cash and cash equivalents, accounts and unbilled receivables, short term investments, accounts payable and accrued multi-client data library royalties, represent their approximate fair value.

The carrying amounts of the Company’s long-term debt as of December 31, 2016 and 2015 were \$163.9 million and \$186.3 million, respectively, compared to its fair values of \$114.8 million and \$107.6 million as of December 31, 2016 and 2015, respectively. The fair value of the long-term debt was calculated using Level 1 inputs, including an active market price.

(17) Benefit Plans

The Company has a 401(k) retirement savings plan, which covers substantially all employees. Employees may voluntarily contribute up to 60% of their compensation, as defined, to the plan. Effective June 1, 2000, the Company adopted a company matching contribution to the 401(k) plan. The Company matched the employee contribution at a rate of 50% of the first 6% of compensation contributed to the plan. Company contributions to the plans were \$0.8 million, \$1.4 million and \$1.8 million, during 2016, 2015 and 2014, respectively.

(18) Selected Quarterly Information — (Unaudited)

A summary of selected quarterly information follows (in thousands, except per share amounts):

Year Ended December 31, 2016	Three Months Ended			
	March 31	June 30	September 30	December 31
Service revenues	\$ 13,156	\$ 25,430	\$ 65,914	\$ 26,140
Product revenues	9,509	10,722	12,708	9,229
Total net revenues	22,665	36,152	78,622	35,369
Gross profit (loss)	(8,930)	4,853	31,765	8,344
Income (loss) from operations	(30,129)	(16,588)	11,864	(8,318)
Interest expense, net	(4,734)	(4,702)	(4,607)	(4,442)
Other income (expense)	120	(1,717)	(2,027)	4,974
Income tax expense (benefit)	293	2,256	3,316	(1,444)
Net (income) loss attributable to noncontrolling interests	22	(79)	(215)	(149)
Net income (loss) applicable to ION	\$(35,014)	\$(25,342)	\$ 1,699	\$ (6,491)
Net income (loss) per share:				
Basic	\$(3.30)	\$(2.22)	\$ 0.14	\$ (0.55)

Diluted \$ (3.30) \$ (2.22) \$ 0.14 \$ (0.55)

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Year Ended December 31, 2015	Three Months Ended			
	March 31	June 30	September 30	December 31
Service revenues	\$20,080	\$23,323	\$ 53,515	\$ 63,562
Product revenues	20,498	13,472	13,159	13,904
Total net revenues	40,578	36,795	66,674	77,466
Gross profit (loss)	(15,788)	(10,135)	11,108	22,818
Loss from operations	(46,689)	(40,689)	(12,874)	(380)
Interest expense, net	(4,625)	(4,607)	(4,854)	(4,667)
Other income (expense)	(3,219)	101,600	(346)	240
Income tax expense	983	532	2,082	447
Net (income) loss attributable to noncontrolling interests	252	297	(227)	(290)
Net income (loss) applicable to ION	\$(55,264)	\$56,069	\$(20,383)	\$(5,544)
Net income (loss) per share:				
Basic	\$(5.04)	\$5.11	\$(1.86)	\$(0.51)
Diluted	\$(5.04)	\$5.11	\$(1.86)	\$(0.51)

(19) Certain Relationships and Related Party Transactions

For 2016, 2015 and 2014, the Company recorded revenues from BGP of \$3.6 million, \$6.3 million and \$6.5 million, respectively. Receivables due from BGP were \$0.4 million and \$0.3 million at December 31, 2016 and 2015, respectively. BGP owned approximately 13.1% of the Company's outstanding common stock as of December 31, 2016.

Mr. James M. Lapeyre, Jr. is the Chairman of the Board on ION's board of directors and a significant equity owner of Laitram, L.L.C. (Laitram), and he has served as president of Laitram and its predecessors since 1989. Laitram is a privately-owned, New Orleans-based manufacturer of food processing equipment and modular conveyor belts.

Mr. Lapeyre and Laitram together owned approximately 8.1% of the Company's outstanding common stock as of December 31, 2016.

The Company acquired DigiCourse, Inc., the Company's marine positioning products business, from Laitram in 1998. In connection with that acquisition, the Company entered into a Continued Services Agreement with Laitram under which Laitram agreed to provide the Company certain bookkeeping, software, manufacturing and maintenance services. Manufacturing services consist primarily of machining of parts for the Company's marine positioning systems. The term of this agreement expired in September 2001 but the Company continues to operate under its terms. In addition, from time to time, when the Company has requested, the legal staff of Laitram has advised the Company on certain intellectual property matters with regard to the Company's marine positioning systems. During 2016, the Company paid Laitram and its affiliates less than \$0.1 million, which consisted of less than \$0.1 million for manufacturing services, and less than \$0.1 million for reimbursement for costs related to providing administrative and other back-office support services in connection with the Company's Louisiana marine operations. For the 2015 and 2014 fiscal years, the Company paid Laitram and its affiliates less than \$0.1 million and \$2.4 million, respectively, for these services. In the opinion of the Company's management, the terms of these services are fair and reasonable and as favorable to the Company as those that could have been obtained from unrelated third parties at the time of their performance.

In July 2013, the Company agreed to lend up to \$10.0 million to INOVA Geophysical, and received a promissory note issued by INOVA Geophysical to the order of the Company, which was scheduled to mature on September 30, 2013. The maturity date of the promissory note was extended to December 31, 2014. The loan was made by the Company to support certain short-term working capital needs of INOVA Geophysical. The indebtedness under the note accrues interest at an annual rate equal to the London Interbank Offered Rate plus 650 basis points or 15%, in the event of a default. In 2013, the Company advanced the full principal amount of \$10.0 million to INOVA Geophysical under the promissory note. INOVA Geophysical has repaid a total of \$6.0 million, of which \$4.0 million remained outstanding at December 31, 2016. The term of the note has not been extended past December 31, 2014, when the note went into default and INOVA has advised the Company that it is not currently able to repay the outstanding amount. In December 2014, the Company wrote down the book value of this receivable to zero. During the fourth quarter 2016,

the Company received \$4.0 million in past due rents from INOVA.

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(20) Recent Accounting Pronouncements

Revenue Recognition — In May 2014, the FASB and the International Accounting Standards Board (“IASB”) jointly issued new accounting guidance for recognition of revenue. In August 2015, the FASB issued guidance deferring the effective date to years beginning after December 15, 2017, and interim periods within those years. This new guidance replaces virtually all existing U.S. GAAP and IFRS guidance on revenue recognition. The underlying principle is that the entity will recognize revenue to depict the transfer of goods and services to customers at an amount that the entity expects to be entitled to in the exchange of goods and services. The guidance provides a five-step analysis of transactions to determine when and how revenue is recognized. Other major provisions include capitalization of certain contract costs, consideration of time value of money in the transaction price, and allowing estimates of variable consideration to be recognized before contingencies are resolved in certain circumstances. The guidance also requires enhanced disclosures regarding the nature, amount, timing and uncertainty of revenue and cash flows arising from an entity’s contracts with customers.

In December 2016, the FASB issued amendments to Accounting Standards Codification (ASC) 606, Revenue from Contracts with Customers. The amendments allow entities not to make quantitative disclosures about remaining performance obligations in certain cases and require entities that use any of the new or previously existing optional exemptions to expand their qualitative disclosures. It also makes additional technical corrections and improvements to the new revenue standard. The guidance will be effective with the same date and transition requirements as those in ASC 606.

While the Company continues to evaluate the two allowed adoption methods (either the full retrospective method or the modified retrospective method) to determine which method it plans to use, the Company currently expects to use the modified retrospective method. The Company also continues to assess whether the implementation of this new guidance will have a material impact on the Company’s New Venture and Devices groups’ consolidated financial position or results of operations for the periods presented. While the Company continues to evaluate the impact on its consolidated financial statements for all of its business segments, the Company does not currently expect the adoption of ASC 606 to have a material impact on its consolidated balance sheets or consolidated statement of operations for its Imaging Services group, Optimization Software & Services group or its Ocean Bottom Services segment.

In February 2016, the FASB issued ASU 2016-02, “Leases (Topic 842)” which introduces the recognition of lease assets and lease liabilities by lessees for those leases classified as operating leases under previous guidance. The guidance will be effective for annual reporting periods beginning after December 15, 2018 and interim periods within those fiscal years with early adoption permitted. The Company currently expects that the adoption of ASU 2016-002 may have a material impact related to its facility operating leases on its consolidated financial statements, and continues to evaluate the impact of vessel leases in the Company’s Ocean Bottom Services segment.

In March 2016, the FASB issued ASU 2016-09, "Compensation - Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting," that will change how companies account for certain aspects of share-based payments to employees. Entities will be required to recognize the income tax effects of awards in the statement of income when the awards vest or are settled, the guidance on employers’ accounting for an employee’s use of shares to satisfy the employer’s statutory income tax withholding obligation and for forfeitures is changing and the update requires companies to present excess tax benefits as an operating activity on the statement of cash flows rather than as a financing activity. The amendments in this update will be effective for annual periods beginning after December 15, 2016 and interim periods within those annual periods. Early adoption is permitted. The Company will adopt ASU 2016-09 in the first quarter of 2017. The Company is unable to estimate the impact of adoption as it is dependent upon future stock option exercises which cannot be predicted, however, the Company is not expecting the adoption of ASU 2016-09 to have a material impact on net income, basic and diluted earnings per share, deferred tax assets or net cash from operations.

In June 2016, the FASB issued ASU 2016-13, "Measurement of Credit Losses on Financial Instruments" that will change how companies measure credit losses for most financial assets and certain other instruments that aren’t measured at fair value through net income. The standard will replace today’s “incurred loss” approach with an “expected loss” model for instruments measured at amortized cost. For available-for-sale debt securities, entities will be required to record allowances rather than reduce the carrying amount. The amendments in this update will be effective for

annual periods beginning after December 15, 2019 and interim periods within those annual periods. Early adoption is permitted for annual periods beginning after December 15, 2018. The Company is evaluating the effect of ASU 2016-13 on our consolidated financial statements.

In August 2016 the FASB issued ASU 2016-15, “Statement of Cash Flows (Topic 230), Classification of Certain Cash Receipts and Cash Payments (a consensus of the FASB Emerging Issues Task Force) (ASU 2016-15)”, that clarifies how entities should classify certain cash receipts and cash payments on the statement of cash flows. The guidance also clarifies how the predominance principle should be applied when cash receipts and cash payments have aspects of more than one class of cash flows. The guidance will be effective for annual periods beginning after December 15, 2017 and interim periods within those annual periods. Early adoption is permitted. The Company is evaluating the effect of ASU 2016-15 on its consolidated financial statements.

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In November 2016 the FASB issued ASU 2016-18, “Statement of Cash Flows (Topic 230), Restricted Cash (a consensus of the FASB Emerging Issues Task Force) (ASU 2016-18)”, that will require entities to show changes in the total of cash, cash equivalents, restricted cash and restricted cash equivalents in the statement of cash flows. As a result, entities will no longer present transfers between cash and cash equivalents and restricted cash and restricted cash equivalents in the statement of cash flows. When cash, cash equivalents, restricted cash and restricted cash equivalents are presented in more than one-line item on the balance sheet, a reconciliation of the totals in the statement of cash flows to the related captions in the balance sheet is required. The guidance will be effective for annual periods beginning after December 15, 2017 and interim periods within those annual periods. Early adoption is permitted. The Company is evaluating the effect of ASU 2016-18 on its consolidated financial statements.

(21) Condensed Consolidating Financial Information

The notes were issued by ION Geophysical Corporation, and are guaranteed by the Company’s current material U.S. subsidiaries: GX Technology Corporation, ION Exploration Products (U.S.A.), Inc. and I/O Marine Systems, Inc. (“the Guarantors”), which are 100-percent-owned subsidiaries. The Guarantors have fully and unconditionally guaranteed the payment obligations of ION Geophysical Corporation with respect to these debt securities. The following condensed consolidating financial information presents the results of operations, financial position and cash flows for:

• ION Geophysical Corporation and the guarantor subsidiaries (in each case, reflecting investments in subsidiaries utilizing the equity method of accounting).

• All other nonguarantor subsidiaries.

• The consolidating adjustments necessary to present ION Geophysical Corporation’s results on a consolidated basis. This condensed consolidating financial information should be read in conjunction with the accompanying consolidated financial statements and notes.

Balance Sheet	December 31, 2016				
	ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Consolidating Adjustments	Total Consolidated
	(In thousands)				
ASSETS					
Current assets:					
Cash and cash equivalents	\$23,042	\$—	\$ 29,610	\$—	\$ 52,652
Accounts receivable, net	—	12,775	7,995	—	20,770
Unbilled receivables	—	5,275	8,140	—	13,415
Inventories	—	8,610	6,631	—	15,241
Prepaid expenses and other current assets	3,387	4,624	1,548	—	9,559
Total current assets	26,429	31,284	53,924	—	111,637
Property, plant, equipment and seismic rental equipment, net	1,745	12,369	53,374	—	67,488
Multi-client data library, net	—	97,369	8,566	—	105,935
Investment in subsidiaries	660,880	257,732	—	(918,612)	—
Goodwill	—	—	22,208	—	22,208
Intangible assets, net	—	3,008	95	—	3,103
Intercompany receivables	—	—	32,174	(32,174)	—
Other assets	2,469	145	231	—	2,845
Total assets	\$691,523	\$ 401,907	\$ 170,572	\$ (950,786)	\$ 313,216
LIABILITIES AND EQUITY					
Current liabilities:					
Current maturities of long-term debt	\$11,281	\$ 3,166	\$ 134	\$—	\$ 14,581
Accounts payable	2,101	19,720	5,068	—	26,889
Accrued expenses	8,579	10,016	7,645	—	26,240
Accrued multi-client data library royalties	—	23,663	—	—	23,663
Deferred revenue	—	2,667	1,042	—	3,709
Total current liabilities	21,961	59,232	13,889	—	95,082
Long-term debt, net of current maturities	143,930	279	—	—	144,209
Intercompany payables	472,276	10,155	—	(482,431)	—
Other long-term liabilities	467	12,117	7,943	—	20,527
Total liabilities	638,634	81,783	21,832	(482,431)	259,818
Equity:					
Common stock	118	290,460	19,138	(309,598)	118
Additional paid-in capital	899,198	180,700	232,590	(413,290)	899,198
Accumulated earnings (deficit)	(824,679)	216,730	(3,639)	(213,091)	(824,679)
Accumulated other comprehensive income (loss)	(21,748)	4,420	(21,787)	17,367	(21,748)
Due from ION Geophysical Corporation	—	(372,186)	(78,071)	450,257	—
Total stockholders' equity	52,889	320,124	148,231	(468,355)	52,889
Noncontrolling interests	—	—	509	—	509
Total equity	52,889	320,124	148,740	(468,355)	53,398
Total liabilities and equity	\$691,523	\$ 401,907	\$ 170,572	\$ (950,786)	\$ 313,216

Balance Sheet	December 31, 2015				
	ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Consolidating Adjustments	Total Consolidated
	(In thousands)				
ASSETS					
Current assets:					
Cash and cash equivalents	\$33,734	\$—	\$ 51,199	\$—	\$ 84,933
Accounts receivable, net	—	35,133	9,232	—	44,365
Unbilled receivables	—	19,046	891	—	19,937
Inventories	—	10,939	21,782	—	32,721
Prepaid expenses and other current assets	5,435	1,458	7,914	—	14,807
Total current assets	39,169	66,576	91,018	—	196,763
Property, plant, equipment and seismic rental equipment, net	4,521	21,072	46,434	—	72,027
Multi-client data library, net	—	120,550	11,687	—	132,237
Investment in subsidiaries	680,508	243,319	—	(923,827)	—
Goodwill	—	—	26,274	—	26,274
Intangible assets, net	—	4,523	287	—	4,810
Intercompany receivables	75,641	—	—	(75,641)	—
Other assets	1,724	146	1,107	—	2,977
Total assets	\$801,563	\$ 456,186	\$ 176,807	\$ (999,468)	\$ 435,088
LIABILITIES AND EQUITY					
Current liabilities:					
Current maturities of long-term debt	\$486	\$ 6,856	\$ 570	\$—	\$ 7,912
Accounts payable	2,086	19,839	7,874	—	29,799
Accrued expenses	11,199	16,200	6,888	—	34,287
Accrued multi-client data library royalties	—	25,045	—	—	25,045
Deferred revenue	—	5,071	1,489	—	6,560
Total current liabilities	13,771	73,011	16,821	—	103,603
Long-term debt, net of current maturities	171,672	3,408	—	—	175,080
Intercompany payables	503,621	68,286	7,355	(579,262)	—
Other long-term liabilities	540	33,305	10,520	—	44,365
Total liabilities	689,604	178,010	34,696	(579,262)	323,048
Equity:					
Common stock	107	290,460	19,138	(309,598)	107
Additional paid-in capital	894,715	180,700	234,234	(414,934)	894,715
Accumulated earnings (deficit)	(759,531)	231,208	(21,729)	(209,479)	(759,531)
Accumulated other comprehensive income (loss)	(14,781)	4,420	(14,604)	10,184	(14,781)
Due from ION Geophysical Corporation	—	(428,612)	(75,009)	503,621	—
Treasury stock	(8,551)	—	—	—	(8,551)
Total stockholders' equity	111,959	278,176	142,030	(420,206)	111,959
Noncontrolling interests	—	—	81	—	81
Total equity	111,959	278,176	142,111	(420,206)	112,040
Total liabilities and equity	\$801,563	\$ 456,186	\$ 176,807	\$ (999,468)	\$ 435,088

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Income Statement	Year Ended December 31, 2016				
	ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Consolidating Adjustments	Total Consolidated
	(In thousands)				
Total net revenues	\$—	\$ 79,006	\$ 93,802	\$ —	\$ 172,808
Cost of goods sold	—	84,373	52,403	—	136,776
Gross profit (loss)	—	(5,367)	41,399	—	36,032
Total operating expenses	31,438	27,274	20,491	—	79,203
Income (loss) from operations	(31,438)	(32,641)	20,908	—	(43,171)
Interest expense, net	(18,406)	(173)	94	—	(18,485)
Intercompany interest, net	978	(4,397)	3,419	—	—
Equity in earnings (losses) of investments	(19,756)	23,368	—	(3,612)	—
Other income (expense)	3,528	702	(2,880)	—	1,350
Income (loss) before income taxes	(65,094)	(13,141)	21,541	(3,612)	(60,306)
Income tax expense	54	1,337	3,030	—	4,421
Net income (loss)	(65,148)	(14,478)	18,511	(3,612)	(64,727)
Net income attributable to noncontrolling interests	—	—	(421)	—	(421)
Net income (loss) attributable to ION	\$(65,148)	\$(14,478)	\$ 18,090	\$ (3,612)	\$(65,148)
Comprehensive net income (loss)	\$(72,331)	\$(14,478)	\$ 10,907	\$ 4,208	\$(71,694)
Comprehensive income attributable to noncontrolling interest	—	—	(421)	—	(421)
Comprehensive net income (loss) attributable to ION	\$(72,331)	\$(14,478)	\$ 10,486	\$ 4,208	\$(72,115)

Income Statement	Year Ended December 31, 2015				
	ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Consolidating Adjustments	Total Consolidated
	(In thousands)				
Total net revenues	\$—	\$ 145,615	\$ 76,954	\$ (1,056)	\$ 221,513
Cost of goods sold	—	126,176	88,390	(1,056)	213,510
Gross profit (loss)	—	19,439	(11,436)	—	8,003
Total operating expenses	26,091	47,579	34,965	—	108,635
Loss from operations	(26,091)	(28,140)	(46,401)	—	(100,632)
Interest expense, net	(18,434)	(351)	32	—	(18,753)
Intercompany interest, net	697	(3,140)	2,443	—	—
Equity in earnings (losses) of investments	16,604	(42,953)	—	26,349	—
Other income (expense)	192	101,978	(3,895)	—	98,275
Income (loss) before income taxes	(27,032)	27,394	(47,821)	26,349	(21,110)
Income tax expense (benefit)	(1,910)	5,031	923	—	4,044
Net income (loss)	(25,122)	22,363	(48,744)	26,349	(25,154)
Net loss attributable to noncontrolling interests	—	—	32	—	32
Net income (loss) attributable to ION	\$(25,122)	\$ 22,363	\$(48,712)	\$ 26,349	\$(25,122)
Comprehensive net income (loss)	\$(27,096)	\$ 20,553	\$(50,551)	\$ 29,966	\$(27,128)
Comprehensive loss attributable to noncontrolling interest	—	—	32	—	32
Comprehensive net income (loss) attributable to ION	\$(27,096)	\$ 20,553	\$(50,519)	\$ 29,966	\$(27,096)

Income Statement	Year Ended December 31, 2014				Total Consolidated
	ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Consolidating Adjustments	
	(In thousands)				
Total net revenues	\$—	\$ 221,008	\$ 291,302	\$ (2,752)	\$ 509,558
Cost of goods sold	—	262,829	187,258	(2,752)	447,335
Gross profit (loss)	—	(41,821)	104,044	—	62,223
Total operating expenses	38,961	88,481	52,710	—	180,152
Income (loss) from operations	(38,961)	(130,302)	51,334	—	(117,929)
Interest expense, net	(18,537)	(245)	(600)	—	(19,382)
Intercompany interest, net	(340)	2,146	(1,806)	—	—
Equity in earnings (losses) of investments	(74,615)	32,043	738	(7,651)	(49,485)
Other income	4,536	74,295	1,029	—	79,860
Income (loss) before income taxes	(127,917)	(22,063)	50,695	(7,651)	(106,936)
Income tax expense	335	1,277	18,970	—	20,582
Net income (loss)	(128,252)	(23,340)	31,725	(7,651)	(127,518)
Net income attributable to noncontrolling interests	—	—	(734)	—	(734)
Net income (loss) attributable to ION	\$(128,252)	\$(23,340)	\$ 30,991	\$ (7,651)	\$(128,252)
Comprehensive net income (loss)	\$(129,921)	\$(23,329)	\$ 30,850	\$ (6,787)	\$(129,187)
Comprehensive income attributable to noncontrolling interest	—	—	(734)	—	(734)
Comprehensive net income (loss) attributable to ION	\$(129,921)	\$(23,329)	\$ 30,116	\$ (6,787)	\$(129,921)

Statement of Cash Flows	Year Ended December 31, 2016			
	ION Geophysical Corporation (In thousands)	The Guarantors	All Other Subsidiaries	Total Consolidated
Cash flows from operating activities:				
Net cash provided by (used in) operating activities	\$ (30,154)	\$ 52,385	\$ (20,660)	\$ 1,571
Cash flows from investing activities:				
Investment in multi-client data library	—	(10,985)	(3,899)	(14,884)
Purchase of property, plant, equipment and seismic rental equipment	(73)	(343)	(1,072)	(1,488)
Proceeds from sale of cost method investments	2,698	—	—	2,698
Other investing activities	—	30	—	30
Net cash provided by (used in) investing activities	2,625	(11,298)	(4,971)	(13,644)
Cash flows from financing activities:				
Borrowings under revolving line of credit	15,000	—	—	15,000
Repayments under revolving line of credit	(5,000)	—	—	(5,000)
Payments on notes payable and long-term debt	(2,070)	(6,316)	(248)	(8,634)
Cost associated with issuance of debt	(6,744)	—	—	(6,744)
Repurchase of common stock	(964)	—	—	(964)
Intercompany lending	31,867	(34,771)	2,904	—
Payments to repurchase bonds	(15,000)	—	—	(15,000)
Other financing activities	(252)	—	—	(252)
Net cash provided by (used in) financing activities	16,837	(41,087)	2,656	(21,594)
Effect of change in foreign currency exchange rates on cash and cash equivalents	—	—	1,386	1,386
Net decrease in cash and cash equivalents	(10,692)	—	(21,589)	(32,281)
Cash and cash equivalents at beginning of period	33,734	—	51,199	84,933
Cash and cash equivalents at end of period	\$ 23,042	\$ —	\$ 29,610	\$ 52,652

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Statement of Cash Flows	Year Ended December 31, 2015			
	ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Total Consolidated
	(In thousands)			
Cash flows from operating activities:				
Net cash provided by (used in) operating activities	\$(425,310)	\$ 225,581	\$ 183,205	\$ (16,524)
Cash flows from investing activities:				
Investment in multi-client data library	—	(44,687)	(871)	(45,558)
Purchase of property, plant, equipment and seismic rental equipment	(347)	(3,945)	(14,949)	(19,241)
Other investing activities	—	1,263	—	1,263
Net cash used in investing activities	(347)	(47,369)	(15,820)	(63,536)
Cash flows from financing activities:				
Payments on notes payable and long-term debt	(153)	(6,467)	(832)	(7,452)
Cost associated with issuance of debt	(145)	—	—	(145)
Repurchase of common stock	(1,989)	—	—	(1,989)
Intercompany lending	352,091	(171,745)	(180,346)	—
Other financing activities	73	—	—	73
Net cash provided by (used in) financing activities	349,877	(178,212)	(181,178)	(9,513)
Effect of change in foreign currency exchange rates on cash and cash equivalents	—	—	898	898
Net decrease in cash and cash equivalents	(75,780)	—	(12,895)	(88,675)
Cash and cash equivalents at beginning of period	109,514	—	64,094	173,608
Cash and cash equivalents at end of period	\$33,734	\$—	\$ 51,199	\$ 84,933

Statement of Cash Flows	Year Ended December 31, 2014			
	ION Geophysical Corporation (In thousands)	The Guarantors	All Other Subsidiaries	Total Consolidated
Cash flows from operating activities:				
Net cash provided by (used in) operating activities	\$(53,925)	\$ 107,590	\$ 76,115	\$ 129,780
Cash flows from investing activities:				
Investment in multi-client data library	—	(67,552)	(233)	(67,785)
Purchase of property, plant and equipment	(1,240)	(4,530)	(2,494)	(8,264)
Repayment of advances by INOVA Geophysical	1,000	—	—	1,000
Net investment in and advances to OceanGeo B.V. prior to its consolidation	—	—	(3,074)	(3,074)
Net proceeds from sale of Source product line	—	9,881	4,513	14,394
Proceeds from sale of a cost-method investment	14,051	—	—	14,051
Other investing activities	579	26	323	928
Net cash provided by (used in) investing activities	14,390	(62,175)	(965)	(48,750)
Cash flows from financing activities:				
Payments under revolving line of credit	(50,000)	—	—	(50,000)
Borrowings under revolving line of credit	15,000	—	—	15,000
Payments on notes payable and long-term debt	—	(5,384)	(7,614)	(12,998)
Cost associated with issuance of debt	(2,194)	—	—	(2,194)
Intercompany lending	61,324	(40,031)	(21,293)	—
Payment of preferred dividends	—	—	(6,000)	(6,000)
Other financing activities	218	—	—	218
Net cash provided by (used in) financing activities	24,348	(45,415)	(34,907)	(55,974)
Effect of change in foreign currency exchange rates on cash and cash equivalents	—	—	496	496
Net increase (decrease) in cash and cash equivalents	(15,187)	—	40,739	25,552
Cash and cash equivalents at beginning of period	124,701	—	23,355	148,056
Cash and cash equivalents at end of period	\$ 109,514	\$ —	\$ 64,094	\$ 173,608

SCHEDULE II
ION GEOPHYSICAL CORPORATION AND SUBSIDIARIES
VALUATION AND QUALIFYING ACCOUNTS

Year Ended December 31, 2014	Balance at Beginning of Year	Charged (Credited) to Costs and Expenses	Deductions	Balance at End of Year
	(In thousands)			
Allowances for doubtful accounts	\$7,222	\$ 7,275	\$ (6,864)	\$ 7,633
Allowances for doubtful notes receivable	—	4,000	—	4,000
Warranty	643	381	(625)	399
Valuation allowance on deferred tax assets	151,035	54,229	—	205,264
Excess and obsolete inventory	32,555	6,952	(9,703)	29,804
Year Ended December 31, 2015	Balance at Beginning of Year	Charged (Credited) to Costs and Expenses	Deductions	Balance at End of Year
	(In thousands)			
Allowances for doubtful accounts	\$7,633	\$ 1,841	\$ (4,555)	\$ 4,919
Allowances for doubtful notes receivable	4,000	—	—	4,000
Warranty	399	13	(288)	124
Valuation allowance on deferred tax assets	205,264	(11,009)	—	194,255
Excess and obsolete inventory	29,804	151	(5,480)	24,475
Year Ended December 31, 2016	Balance at Beginning of Year	Charged (Credited) to Costs and Expenses	Deductions	Balance at End of Year
	(In thousands)			
Allowances for doubtful accounts	\$4,919	\$ 1,834	\$ (5,310)	\$ 1,443
Allowances for doubtful notes receivable	4,000	—	—	4,000
Warranty	124	37	(99)	62
Valuation allowance on deferred tax assets	194,255	23,334	—	217,589
Excess and obsolete inventory	24,475	429	(9,855)	15,049

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EXHIBIT INDEX

- 3.1 Restated Certificate of Incorporation, as amended, filed on November 3, 2016 as Exhibit 3.1 to the Company's Quarterly Report on Form 10-Q and incorporated by reference.
- 3.2 Amended and Restated Bylaws of ION Geophysical Corporation filed on September 24, 2007 as Exhibit 3.5 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- 3.3 Certificate of Ownership and Merger merging ION Geophysical Corporation with and into Input/Output, Inc. dated September 21, 2007, filed on September 24, 2007 as Exhibit 3.1 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- 4.1 Certificate of Rights and Designations of Series D-1 Cumulative Convertible Preferred Stock, dated February 16, 2005 and filed on February 17, 2005 as Exhibit 3.1 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- 4.2 Certificate of Elimination of Series B Preferred Stock dated September 24, 2007, filed on September 24, 2007 as Exhibit 3.2 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- 4.3 Certificate of Elimination of Series C Preferred Stock dated September 24, 2007, filed on September 24, 2007 as Exhibit 3.3 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- 4.4 Certificate of Designation of Series D-2 Cumulative Convertible Preferred Stock dated December 6, 2007, filed on December 6, 2007 as Exhibit 3.1 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- 4.5 Certificate of Designations of Series A Junior Participating Preferred Stock of ION Geophysical Corporation effective as of December 31, 2008, filed on January 5, 2009 as Exhibit 3.1 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- 4.6 Certificate of Elimination of Series A Junior Participating Preferred Stock dated February 10, 2012, filed on February 13, 2012 as Exhibit 3.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- 4.7 Indenture, dated May 13, 2013, among ION Geophysical Corporation, the subsidiary guarantors named therein, Wilmington Trust, National Association, as trustee, and U.S. Bank National Association, as collateral agent, filed on May 13, 2013 as Exhibit 4.1 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- 4.8 Registration Rights Agreement, dated May 13, 2013, among ION Geophysical Corporation, the subsidiary guarantors named therein and Citigroup Global Markets Inc. and Wells Fargo Securities, LLC, as representatives of the initial purchasers named therein, filed on May 13, 2013 as Exhibit 4.2 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- 4.9 Certificate of Elimination of Series D-1 Cumulative Convertible Preferred Stock dated September 30, 2013, filed on September 30, 2013 as Exhibit 3.1 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- 4.10 Certificate of Elimination of Series D-2 Cumulative Convertible Preferred Stock dated September 30, 2013, filed on September 30, 2013 as Exhibit 3.2 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- **10.1 Amended and Restated 1990 Stock Option Plan, filed on June 9, 1999 as Exhibit 4.2 to the Company's Registration Statement on Form S-8 (Registration No. 333-80299), and incorporated herein by reference.
- 10.2 Office and Industrial/Commercial Lease dated June 2005 by and between Stafford Office Park II, LP as Landlord and Input/Output, Inc. as Tenant, filed on March 31, 2006 as Exhibit 10.2 to the Company's Annual Report on Form 10-K for the year ended December 31, 2005, and incorporated herein by reference.
- 10.3 Office and Industrial/Commercial Lease dated June 2005 by and between Stafford Office Park District as Landlord and Input/Output, Inc. as Tenant, filed on March 31, 2006 as Exhibit 10.3 to the Company's Annual Report on Form 10-K for the year ended December 31, 2005, and incorporated herein by reference.
- **10.4 Input/Output, Inc. Amended and Restated 1996 Non-Employee Director Stock Option Plan, filed on June 9, 1999 as Exhibit 4.3 to the Company's Registration Statement on Form S-8 (Registration No. 333-80299), and

incorporated herein by reference.

Amendment No. 1 to the Input/Output, Inc. Amended and Restated 1996 Non-Employee Director Stock
Option Plan dated September 13, 1999 filed on November 14, 1999 as Exhibit 10.4 to the Company's
**10.5 Quarterly Report on Form 10-Q for the fiscal quarter ended August 31, 1999 and incorporated herein by
reference.

- ~~**10.6~~ Input/Output, Inc. Employee Stock Purchase Plan, filed on March 28, 1997 as Exhibit 4.4 to the Company's Registration Statement on Form S-8 (Registration No. 333-24125), and incorporated herein by reference.
- ~~**10.7~~ Fifth Amended and Restated - 2004 Long-Term Incentive Plan, filed as Appendix A to the definitive proxy statement for the 2010 Annual Meeting of Stockholders of ION Geophysical Corporation, filed on April 21, 2010, and incorporated herein by reference.
- 10.8 Registration Rights Agreement dated as of November 16, 1998, by and among the Company and The Laitram Corporation, filed on March 12, 2004 as Exhibit 10.7 to the Company's Annual Report on Form 10-K for the year ended December 31, 2003, and incorporated herein by reference.
- ~~**10.9~~ Input/Output, Inc. 1998 Restricted Stock Plan dated as of June 1, 1998, filed on June 9, 1999 as Exhibit 4.7 to the Company's Registration Statement on S-8 (Registration No. 333-80297), and incorporated herein by reference.
- ~~**10.10~~ Input/Output Inc. Non-qualified Deferred Compensation Plan, filed on April 1, 2002 as Exhibit 10.14 to the Company's Annual Report on Form 10-K for the year ended December 31, 2001, and incorporated herein by reference.
- ~~**10.11~~ Input/Output, Inc. 2000 Restricted Stock Plan, effective as of March 13, 2000, filed on August 17, 2000 as Exhibit 10.27 to the Company's Annual Report on Form 10-K for the fiscal year ended May 31, 2000, and incorporated herein by reference.
- ~~**10.12~~ Input/Output, Inc. 2000 Long-Term Incentive Plan, filed on November 6, 2000 as Exhibit 4.7 to the Company's Registration Statement on Form S-8 (Registration No. 333-49382), and incorporated by reference herein.
- ~~**10.13~~ Employment Agreement dated effective as of March 31, 2003, by and between the Company and Robert P. Peebler, filed on March 31, 2003 as Exhibit 10.1 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- ~~**10.14~~ First Amendment to Employment Agreement dated September 6, 2006, between Input/Output, Inc. and Robert P. Peebler, filed on September 7, 2006, as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- ~~**10.15~~ Second Amendment to Employment Agreement dated February 16, 2007, between Input/Output, Inc. and Robert P. Peebler, filed on February 16, 2007 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- ~~**10.16~~ Third Amendment to Employment Agreement dated as of August 20, 2007 between Input/Output, Inc. and Robert P. Peebler, filed on August 21, 2007 as Exhibit 10.2 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- ~~**10.17~~ Fourth Amendment to Employment Agreement, dated as of January 26, 2009, between ION Geophysical Corporation and Robert P. Peebler, filed on January 29, 2009 as Exhibit 10.1 to the Company's Current Report on Form 8-K and incorporated herein by reference.
- ~~**10.18~~ Employment Agreement dated effective as of June 15, 2004, by and between the Company and David L. Roland, filed on August 9, 2004 as Exhibit 10.5 to the Company's Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2004, and incorporated herein by reference.
- ~~**10.19~~ GX Technology Corporation Employee Stock Option Plan, filed on August 9, 2004 as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2004, and incorporated herein by reference.
- 10.20 Concept Systems Holdings Limited Share Acquisition Agreement dated February 23, 2004, filed on March 5, 2004 as Exhibit 2.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- 10.21 Registration Rights Agreement by and between ION Geophysical Corporation and 1236929 Alberta Ltd. dated September 18, 2008, filed on November 7, 2008 as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q and incorporated herein by reference.
- ~~**10.22~~ Form of Employment Inducement Stock Option Agreement for the Input/Output, Inc. — Concept Systems Employment Inducement Stock Option Program, filed on July 27, 2004 as Exhibit 4.1 to the Company's Registration Statement on Form S-8 (Reg. No. 333-117716), and incorporated herein by reference.

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Form of Employee Stock Option Award Agreement for ARAM Systems Employee Inducement Stock
**10.23 Option Program, filed on November 14, 2008 as Exhibit 4.4 to the Company's Registration Statement on
Form S-8 (Registration No. 333-155378) and incorporated herein by reference.

**10.24 Input/Output, Inc. 2003 Stock Option Plan, dated March 27, 2003, filed as Appendix B of the Company's
definitive proxy statement filed with the SEC on April 30, 2003, and incorporated herein by reference.

- Form of Employment Inducement Stock Option Agreement for the Input/Output, Inc. — GX Technology Corporation Employment Inducement Stock Option Program, filed on April 4, 2005 as Exhibit 4.1 to the Company's Registration Statement on Form S-8 (Reg. No. 333-123831), and incorporated herein by reference.
- **10.25 ION Stock Appreciation Rights Plan dated November 17, 2008, filed as Exhibit 10.47 to the Company's Annual Report on Form 10-K for the year ended December 31, 2008, and incorporated herein by reference.
- **10.26 Canadian Master Loan and Security Agreement dated as of June 29, 2009 by and among ICON ION, LLC, as lender, ION Geophysical Corporation and ARAM Rentals Corporation, a Nova Scotia corporation, filed on August 6, 2009 as Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2009, and incorporated herein by reference.
- 10.27 Master Loan and Security Agreement (U.S.) dated as of June 29, 2009 by and among ICON ION, LLC, as lender, ION Geophysical Corporation and ARAM Seismic Rentals, Inc., a Texas corporation, filed on August 6, 2009 as Exhibit 10.4 to the Company's Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2009, and incorporated herein by reference.
- 10.28 Registration Rights Agreement dated as of October 23, 2009 by and between ION Geophysical Corporation and BGP Inc., China National Petroleum Corporation filed on March 1, 2010 as Exhibit 10.54 to the Company's Annual Report on Form 10-K for the year ended December 31, 2009, and incorporated herein by reference.
- 10.29 Stock Purchase Agreement dated as of March 19, 2010, by and between ION Geophysical Corporation and BGP Inc., China National Petroleum Corporation, filed on March 31, 2010 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- 10.30 Investor Rights Agreement dated as of March 25, 2010, by and between ION Geophysical Corporation and BGP Inc., China National Petroleum Corporation, filed on March 31, 2010 as Exhibit 10.2 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- 10.31 Share Purchase Agreement dated as of March 24, 2010, by and among ION Geophysical Corporation, INOVA Geophysical Equipment Limited and BGP Inc., China National Petroleum Corporation, filed on March 31, 2010 as Exhibit 10.3 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- 10.32 Joint Venture Agreement dated as of March 24, 2010, by and between ION Geophysical Corporation and BGP Inc., China National Petroleum Corporation, filed on March 31, 2010 as Exhibit 10.4 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- 10.33 Fifth Amendment to Employment Agreement dated June 1, 2010, between ION Geophysical Corporation and Robert P. Peebler, filed on June 1, 2010 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- **10.34 Employment Agreement dated August 2, 2011, effective as of January 1, 2012, between ION Geophysical Corporation and R. Brian Hanson, filed on November 3, 2011 as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarterly period ended September 30, 2011, and incorporated herein by reference.
- **10.35 Employment Agreement dated effective as of November 28, 2011, between ION Geophysical Corporation and Gregory J. Heinlein, filed on December 1, 2011 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- **10.36 First Amendment to Credit Agreement and Loan Documents dated May 29, 2012, filed on May 29, 2012 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- **10.37 Consulting Services Agreement dated January 1, 2013, between ION Geophysical Corporation and The Peebler Group LLC, filed on January 4, 2013 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
- **10.38 Second Amended and Restated 2013 Long-Term Incentive Plan.
- *10.39 Purchase Agreement, dated May 8, 2013, among ION Geophysical Corporation, the subsidiary guarantors named therein and Citigroup Global Markets Inc. and Wells Fargo Securities, LLC, as representatives of the
- 10.40

initial purchasers named therein, filed on May 13, 2013 as Exhibit 10.1 to the Company's Current Report on Form 8-K and incorporated herein by reference

- 10.41 Second Lien Intercreditor Agreement by and among China Merchants Bank Co., Ltd., New York Branch, as administrative agent, first lien representative for the first lien secured parties and collateral agent for the first lien secured parties, Wilmington Trust Company, National Association, as trustee and second lien representative for the second lien secured parties, and U.S. Bank National Association, as collateral agent for the second lien secured parties, and acknowledged and agreed to by ION Geophysical Corporation and the other grantors named therein, filed on May 13, 2013 as Exhibit 10.2 to the Company's Current Report on Form 8-K and incorporated herein by reference
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- 10.42 Revolving Credit and Security Agreement dated as of August 22, 2014 among PNC Bank, National Association, as agent for lenders, the lenders from time to time party thereto, as lenders, and PNC Capital Markets LLC, as lead arranger and bookrunner, with ION Geophysical Corporation, ION Exploration Products (U.S.A.), Inc., I/O Marine Systems, Inc. and GX Technology Corporation, as borrowers, filed on November 6, 2014 as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarterly period ended September 30, 2014, and incorporated herein by reference.
- **10.43 ~~Transition and Separation Agreement dated effective as of October 30, 2014, by and between ION Geophysical Corporation and Gregory J. Heinlein.~~
- **10.44 ~~Employment Agreement dated effective as of November 13, 2014, between ION Geophysical Corporation and Steve Bate.~~
- **10.45 ~~Form of Rights Agreement dated March 1, 2015 issued under the ION Stock Appreciation Rights Plan dated November 17, 2008, filed on May 7, 2015 as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarterly period ended March 31, 2015, and incorporated herein by reference.~~
- 10.46 ~~First Amendment to Revolving Credit and Security Agreement dated as of August 4, 2015 among PNC Bank, National Association, as lender and agent, the lenders from time to time party thereto, as lenders, with ION Geophysical Corporation, ION Exploration Products (U.S.A.), Inc., I/O Marine Systems, Inc. and GX Technology Corporation, as borrowers, filed on August 6, 2015 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.~~
- *21.1 ~~Subsidiaries of the Company.~~
- *23.1 ~~Consent of Grant Thornton LLP.~~
- *24.1 ~~The Power of Attorney is set forth on the signature page hereof.~~
- *31.1 ~~Certification of Chief Executive Officer Pursuant to Rule 13a-14(a) or Rule 15d-14(a).~~
- *31.2 ~~Certification of Chief Financial Officer Pursuant to Rule 13a-14(a) or Rule 15d-14(a).~~
- *32.1 ~~Certification of Chief Executive Officer Pursuant to 18 U.S.C. §1350.~~
- *32.2 ~~Certification of Chief Financial Officer Pursuant to 18 U.S.C. §1350.~~
- *101 ~~The following materials are formatted in Extensible Business Reporting Language (XBRL): (i) Consolidated Balance Sheets at December 31, 2016 and 2015, (ii) Consolidated Statements of Operations for the years ended December 31, 2016, 2015 and 2014, (iii) Comprehensive Income (Loss) for the years ended December 31, 2016, 2015 and 2014, (iv) Consolidated Statements of Cash Flows for the years ended December 31, 2016, 2015 and 2014, (v) Consolidated Statements of Stockholders' Equity for the years ended December 31, 2016, 2015 and 2014, (vi) Footnotes to Consolidated Financial Statements and (vii) Schedule II – Valuation and Qualifying Accounts.~~

* Filed herewith.

** Management contract or compensatory plan or arrangement.