ion

Annual Report
2019

NOTICE OF 2020 ANNUAL MEETING
PROXY STATEMENT

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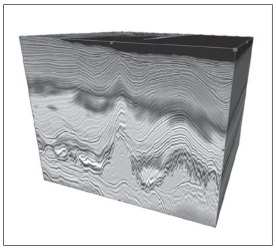
Leveraging innovative technologies, ION delivers the power of data-driven decision-making to offshore energy, ports and defense industries. Data, analytics and digitalization provide a step-change opportunity to translate information into insights, enabling our clients to enhance decision-making, gain a competitive edge and deliver superior returns.

Learn more at iongeo.com.

About ION

Leveraging innovative technologies, ION delivers the power of data-driven decision-making to offshore energy, ports and defense industries. Data, analytics and digitalization provide a step-change opportunity to translate information into insights, enabling our clients to enhance decision-making, gain a competitive edge and deliver superior returns. ION offerings are focused on improving subsurface knowledge to enhance E&P decision-making and improving situational awareness to optimize offshore operations. The business is comprised of two reporting segments: E&P Technology & Services and Operations Optimization.



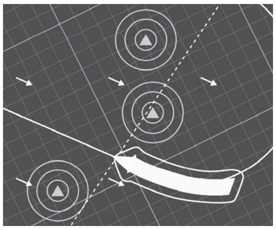
E&P TECHNOLOGY & SERVICES

The E&P Technology & Services segment creates digital data assets and delivers services that improve decision-making, mitigate risk and maximize portfolio value for E&P companies. The segment consists of three synergistic activities that are often integrated to deliver value to clients: Imaging Services, E&P Advisors and Ventures.

ION has one of the most technologically advanced imaging teams in the industry. Imaging Services combines leading technologies and experience to maximize image quality, delivering enhanced subsurface characterization. Raw data is transformed into subsurface images by applying a series of complex proprietary algorithms through ION's highly efficient imaging platform.

E&P Advisors help host governments, E&P companies and private equity firms make optimal decisions throughout the E&P lifecycle. The experienced staff provides technical, commercial and strategic advice to evaluate oil and gas opportunities and assets world-wide, sharing in the value we create.

Ventures leverages the world-class geoscience skills of both the Imaging Services and E&P Advisors groups to create global digital data assets that are licensed to multiple E&P companies to optimize their investment decisions. The global data library consists of over 700,000 km of 2D and 350,000 sq km of 3D multi-client seismic data in virtually all major offshore petroleum provinces.



OPERATIONS OPTIMIZATION

Operations Optimization develops mission-critical subscription offerings and engineering services that enable operational control and optimization offshore. ION provides cutting-edge software, systems and services for both towed streamer and ocean bottom seismic surveys.

ION software offerings leverage a leading data integration platform to control and optimize operations in real time. ION is a leading provider of offshore seismic navigation systems, Orca® and Gator™, as well as survey design software, MESA®.

The newest software offering, Marlin™, supports a step change offshore as companies shift from traditional manual processes to digital solutions that enable better, safer decisions. Similar to air traffic control, Marlin is designed to maximize the safety and efficiency of offshore operations by integrating a variety of data sources (AIS, GIS, GPS, radar, satellite, MetOcean, etc.) with operational plans, creating an unparalleled picture of offshore operations to enhance decision-making.

Devices develops intelligent equipment controlled by our software to optimize operations, such as our industry-leading positioning solution. Engineering Services experts help plan and optimize offshore projects and provide equipment maintenance and training to maximize value from our offerings.

The use of ocean bottom seismic (OBS) continues to expand, driven by the need for higher quality data to make better reservoir development decisions. 4Sea®, ION's next generation ocean bottom nodal platform, is designed to deliver a step change in economics, image quality, QHSE and final data delivery time, delivering superior OBS data faster for enhanced reservoir understanding and improved returns.

Letter to Shareholders

Christopher T. Usher
President and Chief Executive Officer

Dear Fellow Shareholders,

Despite a number of strategic successes in the year, our financial results were disappointing, primarily due to delays in several new acquisition multi-client programs and data library deals. As a result, our full year results were down slightly, rather than the upward trajectory we had been building towards for 2019, with timing on fourth quarter multi-client deals countering annual improvements in all our other businesses. I'd like to share with you our perspective on 2019, the steps we've taken to improve our financial performance, and our goals and investment strategy for 2020.

Diversifying the business

Even before coronavirus and the precipitous drop in oil prices, the E&P industry continued to operate in a subdued lower-for-longer mindset, where cash generation and preservation is king. While this has created a leaner, more profitable industry, our historical bread and butter offerings tend to be perceived among the most discretionary.

In response, we've been laying the groundwork for two meaningful shifts in ION focus for some time. The first was to shift our E&P Technology & Services offerings closer to the reservoir, where capital investment tends to be higher and more consistent than exploration. For our portfolio, that means building 3D offerings. The second was to diversify our Operations Optimization offerings in attractive new markets that could lessen the impact of E&P cycles and maximize our return on technology investments. We've made positive progress on both fronts.

Reflecting on 2019

Approximately three-quarters of our revenues are derived from our E&P Technology & Services offerings, the vast majority of which are sales of our subsurface multi-client data. Historically, our data library was largely 2D exploration focused. In 2019, we grew our 3D multi-client data library 56% to 350,000 square kilometers through cost effective, seamless reimaging of existing data. 37% of our 2019 multi-client revenue was from 3D multi-client sales, an offering that barely registered just four years ago. Our successful foray into 3D reimaging has given us credibility and experience in the 3D market segment, creating a pipeline of opportunities for new 3D towed streamer and/or seabed programs we have not seen prior. We also completed development of enabling technologies like our Enhanced Frequency Source and 4Sea ocean bottom platform to further increase the likelihood of our participation success in new 3D multi-client programs.

We continue to dedicate the majority of our Imaging Services capacity to create distinguished, higher return multi-client offerings, and strategically deploy the remaining resources on challenging proprietary projects that keep ION's technology at the forefront of our customers' minds. Satisfied proprietary customers also become potential underwriters for new multi-client programs. We increased Imaging Services' revenues and had some exceptional repeat business in 2019 around our Full Waveform Inversion technology.

The other quarter of our revenues are from our Operations Optimization offerings that control in-water systems and improve situational awareness to optimize offshore operations. Our Software and Devices groups were up year-on-year largely due to new technology sales and increased marine equipment replacement and repairs. A key focus has been to diversify our offerings, primarily our Marlin software platform, in attractive new markets. In sharp contrast to E&P, we expect sustained growth of digital technologies as new platforms reduce supply chain inefficiencies and increase connectivity and visibility to improve decision-making. We identified ports and harbors as the most attractive initial market for Marlin outside of oil and gas, and in 2019, we signed up our first two clients in addition to increasing adoption in our core market. Our latest release is already surpassing expectations around the digitalization of port workflows.

Steps toward profitability

Building on that, we have taken decisive action to position ION for profitability and long-term success. In January 2020, we executed a program that will limit active priorities to improve focus and execution on strategic initiatives, while delivering annualized cost savings of over $20 million. We are now truly asset light and, while we are retaining our nimble R&D capacity, we have no new multi-year development or manufacturing programs planned. We are innovating around the ongoing commercialization of recent programs and expanding software and digital technology offerings.

In the E&P Technology & Services segment, to accelerate our shift in portfolio weighting from 2D to 3D, we restructured our multi-client business development and streamlined our product delivery strategy.

We took a hard look at ION's legacy SG&A costs in light of our new organization and strategic imperatives, and made changes enabling leaner yet effective support of our two operating segments. These reductions comprised a meaningful part of the $20 million cost savings.

This program was quickly communicated, executed, and well on the way to exhibiting results early in the first quarter.

2020 objectives

While we performed satisfactorily on our 2019 objectives, they didn't result in financial success. So, one aspect of the January change program was to ensure all of ION's 2020 objectives are explicitly tied to measurable financial success.

Our top operational objective for 2020 is to accelerate our entry into the 3D multi-client new acquisition market, where programs' revenue and earnings potential is at least 5 times a typical 2D exploration program. We reorganized our sales team to increase focus on new 3D program development by creating a separate function to monetize our existing data library.

Despite cuts made in other parts of ION's business, we are increasing our business development outreach to accelerate Marlin adoption by ports and harbors, which is our Company's second major 2020 operational objective. We are working with industry experts to refine our Marlin SmartPort roadmap to deliver value, continuing to engage closely with Amazon Web Services to assure efficient provision of this Software as a Service solution and developing other relevant offerings, such as a Port Security system.

Our third objective is to identify a cornerstone partner in both business segments that can accelerate our strategic plans and deliver commercial value. We aim to cultivate partnerships where we can leverage existing technologies or services, without the effort of developing them ourselves, and where ION proprietary components deliver differentiated value.

As an innovative, asset light technology company, digitalization has always been in ION's DNA. We employ some of the most cutting-edge technology in our software platforms and imaging engine. In 2019, we established a Digitalization Team and hired a Chief Digitalization Officer to accelerate and coordinate digital transformation efforts across the company. Our fourth goal is to undertake pragmatic digital transformation programs that either add value to our clients, such as enhancing our digital data library platform, or deliver substantial efficiencies, such as migrating our back-office IT infrastructure to the Cloud.

I'd also like to touch on our efforts to support sustainable business practices. Our recent data library additions are green – they're largely comprised of legacy datasets that we reimage instead of new data acquired by offshore crews, which contribute to the lion share of emissions in our niche industry. We have a number of offerings, such as our Marlin software and 4Sea ocean bottom platform, devoted to increasing operational efficiency, reducing emissions, monitoring environmental compliance and de-manning operations, which will positively impact the carbon footprint of future ION or customer acquisition programs. We also support, through our industry trade association, marine debris collection and a variety of oceanic research.

Outlook

We expect continued portfolio rationalization and high grading as companies seek to find the best return on investment opportunities to meet oil and gas demand in the next decade. Near-term, due to the impact of the coronavirus, project high grading will likely be more acute as a number of our clients have announced budget cuts. While we expect offshore operations to be temporarily impacted by travel restrictions, we believe the demand for digitalization technologies remains robust.

We are proactively assessing the impact of coronavirus and the precipitous drop in oil prices to our business and re-visiting our plans with a focus on liquidity management and expense reduction. Our first actions have been to protect our employees and the communities where they work, and we rapidly shifted 95% of the company to remote working as part of our business continuity plans. We have reduced executive team salaries by 20% and are launching scalable furlough programs to protect our workforce and our ability to service our customers through this period.

While we have already taken measures to mitigate the risk, including launching new offerings to support remote working for our clients, exploring new business models and finding new ways to remotely engage, the extent and duration of coronavirus is a downside risk to our business.

In 2020, we will do fewer things better and continue to build a culture around execution. We are focused on materially entering the 3D new acquisition multi-client market and building out the Marlin SmartPort business.

I would like to thank our shareholders and customers for their continued support and our employees for their hard work and dedication. We have an extremely talented team and I am confident we will successfully navigate the evolving landscape as we have done for the last 50 years.

Chris Usher
President & Chief Executive Officer

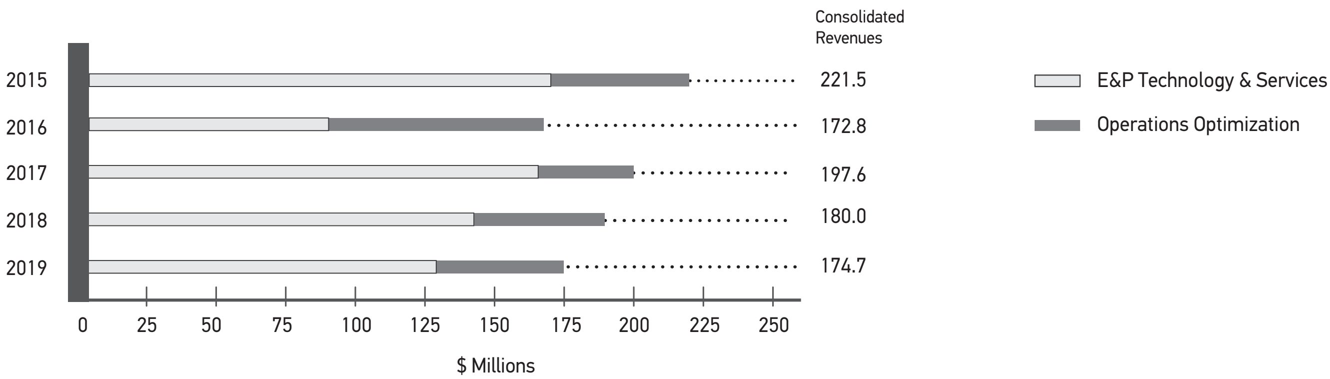
Financial Highlights

	years ended December 31		
	2019	2018	2017
	(in thousands, except per share data)		
STATEMENT OF OPERATIONS DATA			
Net revenues	$ 174,679	$ 180,045	$ 197,554
Gross profit	60,022	59,620	75,639
Loss from operations	(24,459)	(54,272)	(8,699)
Net loss applicable to common shares	(48,199)	(71,171)	(30,242)
Net loss per diluted share	$ (3.41)	$ (5.20)	$ (2.55)
Weighted average number of common and diluted shares outstanding	14,131	13,692	11,876
Balance Sheet Data (end of year)			
Working capital	$ (23,561)	$ 7,891	$ (8,628)
Total assets	233,194	292,552	301,069
Long-term debt[a]	121,459	121,741	156,744
Total (deficit) equity	(34,632)	7,824	30,806
Other Data			
Investment in multi-client library	$ 28,804	$ 28,276	$ 23,710
Capital expenditures	2,411	1,514	1,063
Depreciation and amortization (other than multi-client library)	3,657	8,763	16,592
Amortization of multi-client library	39,541	48,988	47,102

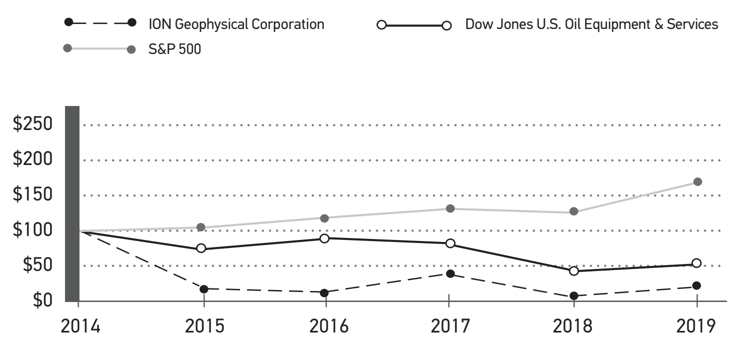
(a) Includes current maturities of long-term debt.

The selected consolidated financial data set forth above with respect to our consolidated statements of operations for 2019, 2018 and 2017 and with respect to our consolidated balance sheets at December 31, 2019, 2018 and 2017 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 impairments and write-downs of assets during the periods presented, which affect the comparability of the financial information shown. For a detailed discussion of these items impacting the comparability of the financial information, please see Item 6, "Selected Financial Data," in our Annual Report on Form 10-K for the year ended December 31, 2019. Also, this information 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 our Annual Report on Form 10-K for the year ended December 31, 2019.

Annual Revenues



Shareholder Returns



	2014	2015	2016	2017	2018	2019
	100.00	18.29	14.55	47.88	12.56	21.04
	100.00	101.38	113.51	138.29	132.23	173.86
	100.00	77.53	98.70	82.20	47.38	51.26

This graph compares our cumulative total stockholder return on our common stock for the five years ending December 31, 2019, assuming reinvestment of dividends, with (i) the S&P 500 Index and (ii) the Dow Jones U.S. Oil Equipment and Services Index, an index of companies that we believe are comparable in terms of industry and their lines of business.

The graph assumes that $100 was invested in our common stock and the above indices on January 1, 2014. We have not paid any dividends on our common stock during the applicable period. Historic stock price performance is not necessarily indicative of future stock price performance.

ION GEOPHYSICAL CORPORATION

2105 CityWest Boulevard, Suite 100
Houston, Texas 77042-2855
(281) 933-3339

NOTICE OF ANNUAL MEETING OF SHAREHOLDERS
To Be Held May 26, 2020

To ION's Shareholders:

The 2020 Annual Meeting of Shareholders of ION Geophysical Corporation ("ION") will be held on Tuesday, May 26, 2020, at 10:30 a.m Houston, Texas time. The meeting will either be held in the offices of ION located at 2105 CityWest Boulevard, Houston, Texas, or remotely, or both. ION will announce the decision as to whether the meeting will be at our offices, or remote, or both, in advance of the meeting. The decision will be filed with the SEC, and posted on our website (www.iongeo.com under "Investor Relations—Investor Materials—Annual Report & Proxy Statement"), in advance of the meeting. The meeting will be held for the following purposes:

1. Elect the two directors named in the attached Proxy Statement to our Board, each to serve for a three-year term;

2. Advisory (non-binding) vote to approve the compensation of our named executive officers;

3. Ratify the appointment of Grant Thornton LLP as our independent registered public accounting firm (independent auditors) for 2020; and

4. Consider any other business that may properly come before the annual meeting, or any postponement or adjournment of the meeting.

ION's Board of Directors has set March 27, 2020, as the record date for the meeting. This means that owners of ION Common Stock at the close of business on that date are entitled to receive this notice of meeting and vote at the meeting and any adjournments or postponements of the meeting.

Your vote is very important, and your prompt cooperation in voting your proxy is greatly appreciated. Whether or not you plan to attend the meeting, please sign, date and return your enclosed proxy card as soon as possible so that your shares can be voted at the meeting.

By Authorization of the Board of Directors

Matthew Powers
Executive Vice President, General Counsel
and Corporate Secretary

April 22, 2020
Houston, Texas

ION GEOPHYSICAL CORPORATION

2105 CityWest Boulevard, Suite 100
Houston, Texas 77042-2855
(281) 933-3339
April 22, 2020

PROXY STATEMENT
FOR ANNUAL MEETING OF SHAREHOLDERS
To Be Held May 26, 2020

Our Board of Directors (the "Board") is furnishing you this proxy statement (this "Proxy Statement") to solicit proxies on its behalf to be voted at the 2020 Annual Meeting of Shareholders ("Annual Meeting") of ION Geophysical Corporation ("ION"). The Annual Meeting will be held either remotely or in person at 2105 CityWest Boulevard, Houston, Texas, on May 26, 2020, at 10:30 a.m., local time. Directions to the annual meeting are also provided in this Proxy Statement under "*About the Meeting—Where will the Annual Meeting be held?*"

The matters intended to be acted upon are:

1. Elect the two directors named in the attached Proxy Statement to our Board, each to serve for a three-year term;

2. Advisory (non-binding) vote to approve the compensation of our named executive officers;

3. Ratify the appointment of Grant Thornton LLP as our independent registered public accounting firm (independent auditors) for 2020; and

4. Consider any other business that may properly come before the annual meeting, or any postponement or adjournment of the meeting.

The Board of Directors recommends voting in favor of the nominees listed in the Proxy Statement, the approval of the compensation of our named executive officers and the ratification of the appointment of Grant Thornton LLP.

The mailing address of our principal executive offices is 2105 CityWest Boulevard, Suite 100, Houston, Texas 77042-2855. We are mailing the proxy materials to our shareholders beginning on or about April 22, 2020. All properly completed and returned proxies for the annual meeting will be voted at the Annual Meeting in accordance with the directions given in the proxy, unless the proxy is revoked before the Annual Meeting. The proxies also may be voted at any adjournments or postponements of the Annual Meeting.

Only owners of record of our outstanding shares of our Common Stock, par value $0.01 ("Common Stock") on March 27, 2020 are entitled to vote at the Annual Meeting, or at adjournments or postponements of the Annual Meeting. Each owner of Common Stock on the record date is entitled to one vote for each share of Common Stock held. On March 27, 2020, there were 15,027,563 shares of Common Stock issued and outstanding.

When used in this Proxy Statement, "ION Geophysical," "ION," "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.

Important Notice Regarding the Availability of Proxy Materials
For the Annual Shareholders' Meeting to be held on May 26, 2020
The Proxy Statement and our 2019 annual report to shareholders
are available at www.iongeo.com under "*Investor Relations—Investor Materials—Annual Report & Proxy Statement*."

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2020 PROXY STATEMENT HIGHLIGHTS

This summary highlights information contained elsewhere in our Proxy Statement. This summary does not contain all of the information that you should consider. You should read the entire Proxy Statement carefully before voting.

Board Nominees

Name	Age	Director Since	Occupation	Independent	Committee Memberships: Audit	Comp	Gov	Fin
John N. Seitz	68	2003	Chairman and Chief Executive Officer, GulfSlope Energy, Inc.	*		*	*	*
Tina L. Wininger	51	2019	Controller, Next Wave Energy Partners	*	*			

Executive Compensation Highlights

ION is committed to paying for performance. We provide the majority of compensation to our executives through programs in which the amounts ultimately received vary to reflect our performance. Our executive compensation programs evolve and are adjusted over time to support our business goals and to promote both near-term and long-term profitable company growth.

The majority of cash compensation is paid through base salary and under our annual incentive cash plan (that is, annual cash bonuses). Payment under our annual incentive cash plan is based on company performance relative to the Company's goals and on individual performance. Under our annual incentive cash plan, cash compensation reflects near-term (annual) business performance of the Company. Our employees can also receive cash payments through awards of stock appreciation rights ("SARs").

Awards of SARs and equity awards (consisting of stock options, restricted stock and restricted stock units) are used to align compensation with the long-term interests of our shareholders by focusing our executive officers on total shareholder return. Equity and SARs awards generally contain a time-based vesting restriction—that is, they become fully vested in either three or four years after the grant date, contingent on continued employment—so that compensation realized under the awards is dependent on the long-term performance of our Common Stock. Our most recent broad-based grant of SARs and restricted stock awards, granted in December 2018, contain, in addition to a time-based vesting restriction, a performance-based vesting restriction based on the price of our common stock (meaning, in addition to the time requirements, our stock price must attain and maintain certain price levels within three years for the awards to vest). No SARS were granted to any executive in 2019. As further discussed below, our current CEO, Mr. Christopher T. Usher, received a grant of restricted stock in connection with his promotion to that role, half of which had a performance-based vesting restriction (in addition to the traditional time-based restriction).

In setting executive officer compensation, the Compensation Committee evaluates individual performance reviews of the executive officers and compensation of executives at other companies as reported by various research and advisory companies (such as Gardner, Inc., and Willis Towers Watson). This past year (2019), the Company also engaged a compensation consulting firm, Aon Hewitt, to help determine appropriate compensation for our Chief Executive Officer.

Total compensation for each executive officer varies with ION's performance in achieving strategic and financial objectives and with individual performance. Each executive officer's compensation is designed to reward his or her contribution to ION's results. Our executive officers' 2020 compensation also reflects adjustments arising from our normal annual process of assessing pay competitiveness. Year-over-year changes in salaries and equity award levels also reflect promotions, individual performance and competitive market adjustments. The following table shows the total direct compensation granted by the Compensation Committee to our named executive officers in 2019, 2018 and 2017 (except for Mr. Schwausch, who became a named executive officer in 2019):

Name and Principal Position	Year	Salary ($)	Bonus ($)	Stock Awards ($)	Option Awards ($)	Non-Equity Incentive Plan Compensation ($)	Total Direct Compensation ($)
Christopher T. Usher	2019	457,412	—	962,000	—	—	1,419,412
President and CEO	2018	378,560	—	1,023,188	130,427	220,600	1,752,775
starting June 1, 2019	2017	353,808	—	—	—	347,000	700,808
Executive Vice President and Chief Operating Officer, Operations Optimization through May 31, 2019							
R. Brian Hanson**(1)**	2019	276,923	—	—	—	250,000	526,923
President and CEO	2018	600,000	—	1,888,032	262,400	582,000	3,332,432
through June 1, 2019	2017	558,689	—	—	—	1,200,000	1,758,689
Steven A. Bate**(2)**	2019	375,000	—	—	—	281,250	656,250
Executive Vice President	2018	375,000	—	1,092,322	130,427	273,100	1,870,849
and CFO	2017	350,484	—	—	—	450,000	800,484
Matthew R. Powers	2019	275,000	—	—	—	—	275,000
Executive Vice President,	2018	275,000	—	365,943	56,027	160,200	857,170
General Counsel and Corporate Secretary	2017	220,664	—	168,600	291,540	165,000	845,804
Scott P. Schwausch	2019	200,450	—	—	—	—	200,048
Vice President, Corporate Controller, and Chief Accounting Officer							
Kenneth G. Williamson	2019	387,213	—	—	—	—	387,213
Executive Vice President	2018	387,213	—	1,086,632	130,427	211,500	1,815,772
and Chief Operating Officer, E&P Technology & Services	2017	361,905	—	—	—	508,000	869,905

(1) R. Brian Hanson resigned from the Company on June 1, 2019, and received an additional $656,900 in 2019 in connection with his severance contract, which is explained in greater detail in "*Executive Compensation,*" below.

(2) Mr. Bate stepped down from his role as Chief Financial Officer effective February 1, 2020.

ABOUT THE MEETING

What is a proxy, a proxy solicitation and a proxy statement?

A proxy is your legal designation of another person to vote the stock you own on your behalf. That other person is also referred to as a "proxy." A proxy solicitation is a request that a shareholder authorize another person to cast the shareholder's vote at a shareholders' meeting. Our Board has designated Christopher T. Usher and James M. Lapeyre, Jr. as proxies for the Annual Meeting of Shareholders. By completing and submitting the enclosed proxy card, you are giving Mr. Usher and Mr. Lapeyre the authority to vote your shares in the manner you indicate on your proxy card. A proxy statement is an informational document that the regulations of the Securities and Exchange Commission ("SEC") require us to give you when we ask you, in a proxy solicitation, to sign a proxy card designating individuals as proxies to vote on your behalf.

Who is soliciting my proxy?

Our Board is soliciting proxies on its behalf to be voted at the Annual Meeting. All costs of soliciting the proxies will be paid by ION. Copies of solicitation materials will be furnished to banks, brokers, nominees and other fiduciaries and custodians to forward to beneficial owners of Common Stock held by such persons. ION will reimburse such parties for their reasonable out-of-pocket expenses in forwarding solicitation materials. In addition to solicitations by mail, some of ION's directors, officers and other employees, without extra compensation, might supplement this solicitation by telephone, personal interview or other communication. ION has also retained Georgeson LLP to assist with the solicitation of proxies from banks, brokers, nominees and other holders, for a fee not to exceed $11,500 plus reimbursement for out-of-pocket expenses.

What are the voting rights of holders of Common Stock?

Each outstanding share of Common Stock is entitled to one vote on each matter considered at the Annual Meeting.

What is the difference between a "shareholder of record" and a shareholder who holds stock in "street name"?

If your shares are registered directly in your name, you are a shareholder of record. If your shares are registered in the name of your broker, bank or similar organization, then you are the beneficial owner of shares held in street name.

Where will the Annual Meeting be held?

ION's 2020 Annual Meeting of Shareholders may be held in person. If so, it will be held on the 1st Floor of 2105 CityWest Boulevard in Houston, Texas.

Directions: The site for the Annual Meeting is located on CityWest Boulevard off of West Sam Houston Parkway South ("Beltway 8"), near the intersection of Beltway 8 and Briar Forest Drive. Traveling south on the Beltway 8 feeder road after Briar Forest Drive, turn right on Del Monte Drive. Enter Garage Entrance 3 on your immediate left. Advise the guard that you are attending the ION Annual Meeting. You may be required to show your driver's license or other photo identification. The guard will then direct you where to park in the visitors section of the parking garage. The guard can also direct you to 2105 CityWest Boulevard, which is directly south of the garage. Once in the building, check in at the security desk where you will then be directed to the first floor receptionist.

SPECIAL NOTE REGARDING POTENTIAL CHANGES TO OUR MEETING: Although we intend to hold our annual meeting in person, we are sensitive to concerns our shareholders may have, and recommendations that public health officials may issue, in light of the coronavirus (COVID-19) pandemic. Accordingly, we may impose additional procedures or limitations on meeting attendees or may decide to hold the meeting in a different location or solely by means of remote communication (i.e., a virtual-only meeting). We plan to announce this decision in advance and details will be posted on our website, and filed with the SEC. We encourage you to check our website (*www.iongeo.com* under "Investor Relations—Investor Materials—Annual Report & Proxy Statement) prior to the meeting if you plan to attend.

What is the effect of not voting?

It depends on how ownership of your shares is registered. If you are a shareholder of record, your unvoted shares will not be represented at the Annual Meeting and will not count toward the quorum requirement. Assuming a quorum is obtained, your unvoted shares will not be treated as a vote for or against a proposal. Depending on the circumstances, if you own your shares in street name, your broker or bank may represent your shares at the Annual Meeting for purposes of obtaining a quorum. As described in the answer to the question immediately following, in the absence of your voting instruction, your broker may or may not vote your shares.

If I don't vote, will my broker vote for me?

If you own your shares in street name and you do not vote, your broker may vote your shares in its discretion on proposals determined to be "routine matters" under the rules of the New York Stock Exchange ("NYSE"). With respect to "non-routine matters," however, your broker may not vote your shares for you. Where a broker cannot vote your shares on non-routine matters because he has not received any instructions from you regarding how to vote, the number of unvoted shares on those matters is reported as "broker non-votes." These "broker non-vote" shares are counted toward the quorum requirement, but, generally speaking, they do not affect the determination of whether a matter is approved. See *"—How are abstentions and broker non-votes counted?"* below. The election of directors and the advisory vote on executive compensation are not considered to be routine matters under current NYSE rules, so your broker will not have discretionary authority to vote your shares held in street name on those matters. The proposal to ratify the appointment of Grant Thornton LLP ("Grant Thornton") as our independent registered public accounting firm is considered to be a routine matter on which brokers will be permitted to vote your shares without instructions from you.

What is the record date and what does it mean?

The record date for the Annual Meeting of Shareholders is March 27, 2020. The record date is established by the Board as required by Delaware law (the state in which we are incorporated). Holders of Common Stock at the close of business on the record date are entitled to receive notice of the Annual Meeting and vote at the Annual Meeting and any adjournments or postponements of the Annual Meeting.

How can I revoke a proxy?

A shareholder can revoke a proxy prior to the vote at the Annual Meeting by (a) giving written notice to the Corporate Secretary of ION, (b) delivering a later-dated proxy or (c) voting in person at the Annual Meeting. Written notice to the Corporate Secretary should be sent to Corporate Secretary, ION Geophysical Corporation, 2105 CityWest Boulevard, Suite 100, Houston, Texas 77042-2855. If you hold shares through a bank or broker, you must contact that bank or broker in order to revoke any prior voting instructions.

What constitutes a quorum?

The presence, in person or by proxy, of the holders of a majority of the outstanding shares of Common Stock constitutes a quorum. We need a quorum of shareholders to hold a validly convened Annual Meeting. If you have submitted your proxy, your shares will be counted toward the quorum. If a quorum is not present, the chairman may adjourn the Annual Meeting, without prior notice other than by announcement at the Annual Meeting, until the required quorum is present. As of the record date, 15,055,870 shares of Common Stock were outstanding. Thus, the presence of the holders of Common Stock representing at least 7,527,936 shares will be required to establish a quorum.

What are my voting choices when voting for director nominees, and what vote is needed to elect directors?

In voting on the election of the director nominees to serve until the 2023 Annual Meeting of Shareholders, shareholders may vote in one of the following ways:

(a) in favor of all nominees,

(b) withhold votes as to all nominees or

(c) withhold votes as to a specific nominee.

Directors will be elected by a plurality of the votes of the shares of Common Stock present or represented by proxy at the Annual Meeting. This means that director nominees receiving the highest number of "for" votes will be elected as directors. Votes "for" and "withheld" are counted in determining whether a plurality has been cast in favor of a director. Under ION's Corporate Governance Guidelines, any director nominee who receives a greater number of votes "withheld" from his or her election than votes "for" such election shall promptly tender to the Board his or her resignation following certification of the results of the shareholder vote. For a more complete explanation of this requirement and process, please see *"Item 1—Election of Directors—Board of Directors and Corporate Governance—Majority Voting Procedure for Directors"* below.

If you vote, you may not abstain from voting for purposes of the election of directors. Shareholders are not permitted to cumulate their votes in the election of directors.

The Board recommends a vote **"FOR"** all of the nominees.

What are my voting choices when casting an advisory vote to approve the compensation of our named executive officers?

In casting an advisory vote to approve the compensation of our named executive officers, shareholders may vote in one of the following ways:

(a) in favor of the advisory vote to approve our executive compensation,

(b) against the advisory vote to approve our executive compensation or

(c) abstain from voting.

The advisory vote to approve the compensation of our named executive officers will be approved if the number of votes cast in favor of the proposal exceeds the number of votes cast against it.

The Board recommends a vote **"FOR"** this proposal.

What are my voting choices when voting on the ratification of the appointment of Grant Thornton as our independent registered public accounting firm—or independent auditors—and what vote is needed to ratify their appointment?

In voting to ratify the appointment of Grant Thornton as independent auditors for 2020, shareholders may vote in one of the following ways:

(a) in favor of ratification,

(b) against ratification or

(c) abstain from voting on ratification.

The proposal to ratify the appointment of Grant Thornton will require the affirmative vote of a majority of the votes cast on the proposal by holders of Common Stock in person or represented by proxy at the Annual Meeting.

The Board recommends a vote **"FOR"** this proposal.

Will any other business be transacted at the Annual Meeting? If so, how will my proxy be voted?

We do not know of any business to be transacted at the Annual Meeting other than those matters described in this Proxy Statement. We believe that the periods specified in our Amended and Restated Bylaws (our "Bylaws") for submitting proposals to be considered at the Annual Meeting have passed and no proposals were submitted. However, should any other matters properly come before the Annual Meeting, and should any adjournments or postponements of the Annual Meeting be proposed, shares with respect to which voting authority has been granted to the proxies will be voted by the proxies in accordance with the proxies' respective judgment.

What if I do not specify a choice for a matter when submitting my proxy?

Shareholders should specify their choice for each matter on their proxy. If no instructions are given, in a proxy that is properly submitted, that proxy will be voted **"FOR"** the election of all director nominees, **"FOR"** the non-binding advisory vote to approve our Company's executive compensation and **"FOR"** the proposal to ratify the appointment of Grant Thornton as independent auditors for 2020.

How are abstentions and broker non-votes counted?

Abstentions are counted for purposes of determining whether a quorum is present at the Annual Meeting. A properly submitted proxy marked "withhold" with respect to the election of one or more directors will not be voted with respect to the director or directors indicated, although it will be counted for purposes of determining whether there is a quorum.

With respect to (i) the proposal regarding the advisory vote on executive compensation and (ii) the proposal to ratify the appointment of the independent auditors, an abstention from voting on either such proposal will be counted as present in determining whether a quorum is present but will not be counted in determining the total votes cast on such proposal. Thus, abstentions will have no effect on the outcome of the vote on these proposals.

Broker non-votes will have no effect on the outcome of the vote on any of the proposals.

What is the deadline for submitting proposals to be considered for inclusion in the 2021 proxy statement and for submitting a nomination for director of ION for consideration at the Annual Meeting of Shareholders in 2021?

Shareholder proposals requested to be included in our 2021 proxy statement must be received by ION no later than December 20, 2020. A proper director nomination may be considered at ION's 2021

Annual Meeting of Shareholders only if the proposal for nomination is received by ION not later than December 20, 2020. Proposals and nominations should be directed to Corporate Secretary, ION Geophysical Corporation, 2105 CityWest Boulevard, Suite 100, Houston, Texas 77042-2855.

Will I have electronic access to the proxy materials and Annual Report?

The notice of Annual Meeting, Proxy Statement and 2019 Annual Report to Shareholders are posted on ION's Internet website at *www.iongeo.com* under "Investor Relations—Investor Materials—Annual Report & Proxy Statement".

How can I obtain a copy of ION's Annual Report on Form 10-K?

A copy of our 2019 Annual Report on Form 10-K (without schedules or exhibits) forms a part of our 2019 Annual Report to Shareholders, which is enclosed with this Proxy Statement. You may obtain an additional copy of our 2019 Form 10-K at no charge by sending a written request to Corporate Secretary, ION Geophysical Corporation, 2105 CityWest Boulevard, Suite 100, Houston, Texas 77042-2855. Our Form 10-K is also available (i) through the Investor Relations section of our website at *www.iongeo.com* and (ii) with exhibits on the SEC's website at *http://www.sec.gov*.

Please note that the contents of these and any other websites referenced in this Proxy Statement are not incorporated by reference herein. Further, our references to the URLs for these and other websites listed in this Proxy Statement are intended to be inactive textual references only.

ITEM 1—ELECTION OF DIRECTORS

Our Board currently consists of eight members. The Board is divided into three classes. Members of each class are elected for three-year terms and until their respective successors are duly elected and qualified, unless the director dies, resigns, retires, is disqualified or is removed. Our shareholders elect the directors in a designated class annually. Directors in Class III, which is the class of directors to be elected at the Annual Meeting, will serve on the Board until our annual meeting in 2023 (except in the case of any earlier death, resignation, retirement, disqualification or removal).

The current Class III directors are John N. Seitz and Tina L. Wininger, and their current terms will expire when their successors are elected and qualified at the Annual Meeting. At its meeting on February 3, 2020, the Board approved the recommendation of the Governance Committee that Mr. Seitz and Ms. Wininger be nominated to stand for reelection at the Annual Meeting to hold office until our 2023 Annual Meeting and until their successors are elected and qualified.

We have no reason to believe that any of the nominees will be unable or unwilling to serve if elected. However, if any nominee should become unable or unwilling to serve for any reason, proxies may be voted for another person nominated as a substitute by our Board, or our Board may reduce the number of directors.

The Board of Directors recommends a vote "FOR" the election of each of John N. Seitz and Tina L. Wininger

The biographies of each nominee (each of whom is also a current director) contains information regarding the nominee's service as a director, business experience, education, director positions and the experiences, qualifications, attributes or skills that caused the Governance Committee and our Board to determine that the person should serve as a director for the Company:

Class III Director—Nominees for Re-Election for Term Expiring In 2023

JOHN N. SEITZ Director since 2003

Mr. Seitz, age 68, has been Chairman and Chief Executive Officer of GulfSlope Energy, Inc., an OTC-listed independent E&P company exploring for oil and gas using advanced seismic imaging, since 2013. From 1977 to 2003, Mr. Seitz held positions of increasing responsibility at Anadarko Petroleum Company, serving most recently as a Director and as President and Chief Executive Officer. Mr. Seitz has served as a Trustee of the American Geological Institute Foundation. Mr. Seitz currently serves on the Investment Committee for Sheridan Production Company, LLC, a privately held oil & gas company with interests in Texas, Oklahoma and Wyoming. He formerly served on the Board of Directors for Endeavour International, Inc., Constellation Energy Partners LLC, and Gulf United Energy, Inc. Mr. Seitz is chairman of the Governance Committee and a member of the Compensation Committee and the Finance Committee of our Board. Mr. Seitz holds a Bachelor of Science degree in geology from the University of Pittsburgh, a Master of Science degree in geology from Rensselaer Polytechnic Institute and is a Certified Professional Geoscientist in Texas. He also completed the Advanced Management Program at the Wharton School of Business.

Mr. Seitz' extensive experience as a leader of global E&P companies has proven to be an important resource for our Board when considering industry and customer issues. In addition, Mr. Seitz' geology background and expertise assists the Board in better understanding industry trends and issues.

TINA L. WININGER Director since 2019

Ms. Wininger, age 51, joined ION's Board of Directors in June 2019 and is also a member of the Audit Committee. She is the Controller at Next Wave Energy Partners, an independent energy company focused on midstream and downstream petrochemical and fuels assets. Since 2010, Ms. Wininger has also served as the CFO, a member of the Board of Directors and Chairman of the Finance committee for The Micah Project, a non-profit organization focused on at-risk young men in Honduras. From 2005 to 2010, Ms. Wininger was the Chief Accounting Officer and Vice President of Accounting of Plains All American Pipeline, a Fortune 100 company listed on the NYSE, which had approximately $25 billion in annual revenues and $4 billion of market cap during her tenure. She also served as their Controller from 2000 to 2005. From 1997 to 2000, Ms. Wininger lived in Venezuela and served as a consultant to Conoco de Venezuela S.A. on their exploration project in La Ceiba. From 1994 to 1997, she was the Controller of Plains Resources Inc., an oil and gas exploration and production company. From 1991 to 1994, she worked at Arthur Andersen & Co. in their oil and gas audit practice in New Orleans and the surrounding areas. She holds a Bachelor of Science degree in Management from Tulane University.

Ms. Wininger is a successful corporate executive with over 20 years' experience in energy, spanning upstream, midstream and downstream sectors as well as petrochemicals. While her primary responsibility has been public company accounting and reporting, Ms. Wininger has also participated in establishing corporate vision, strategy and goals as a member of senior management, and been instrumental in realizing those goals in various ways including the integration of numerous acquired businesses and related capital raising activities. Ms. Wininger brings a wealth of industry knowledge, financial acumen and management experience to the team.

Class I Director—Term Expiring In 2021

CHRISTOPHER T. USHER Director since 2019

Mr. Usher, age 59, is our President and Chief Executive Officer. Mr. Usher joined ION in November 2012 as the Executive Vice President and Chief Operating Officer, GeoScience Division. Prior to joining our Company, Mr. Usher served as the Senior Vice President, Data Processing, Analysis and Interpretation and Chief Technology Officer (including significant merger and acquisitions responsibility) of Global Geophysical Services, Inc., a NYSE-listed seismic products and services company, since January 2010. Prior to joining Global, Mr. Usher served from October 2005 to January 2010 as Senior Director at Landmark Software and Services (including significant merger and acquisition responsibility), a division of Halliburton Company, an oilfield services company. From 2004 to 2005, he was Senior Corporate Vice President, Integrated Services, at Paradigm Geotechnology, an E&P software company. From 2000 to 2003, Mr. Usher served as President of the global data processing division of Petroleum Geo-Services (PGS), a marine geophysical contracting company. He began his career at Western Geophysical where he served in a number of roles over his 17-year tenure before becoming the Worldwide VP of Technology. Mr. Usher holds a Bachelor of Science degree in geology and geophysics from Yale University.

HUASHENG ZHENG Director since 2018

Mr. Zheng, age 53, has been employed by China National Petroleum Corporation ("CNPC"), China's largest oil company, and its affiliates in various positions of increasing responsibility since 1994. Since 2018, he has been Executive Vice President of BGP Inc., China National Petroleum Corporation ("BGP"). BGP is a subsidiary of CNPC and is the world's largest land seismic contractor. From 1994 to 1997, Mr. Zheng was Legal Representative & Financial Supervisor, Ecuador Branch. From 1997 to 1998, he was Representative of the Sudan Office of BGP International. From 1998 to 1999, Mr. Zheng was Manager of Strategy & Planning Department, BGP International. From 1999 to 2003, Mr. Zheng was Vice President of BGP International. From 2005 to 2009, Mr. Zheng was President of BGP International and Assistant President of BGP. From 2010 to 2018, Mr. Zheng was Vice President of

BGP. He holds a Masters of Business Administration degree from the University of Calgary, Haskayne School of Business.

Mr. Zheng has over 20 years of experience in geophysical program management, particularly in international business. Mr. Zheng's position with BGP and his extensive knowledge of the global seismic industry enables our Board to receive current input and advice reflecting the perspectives of our seismic contractor customers. In addition, our land equipment joint venture with BGP and the ever-increasing importance of China in the global economy and the worldwide oil and gas industry has elevated our commercial involvement with China and Chinese companies. Mr. Zheng's insights with regard to issues relating to China provide our Board with a valuable resource.

Mr. Zheng was appointed to our Board of Directors under the terms of the Company's Investor Rights Agreement with BGP. Under the agreement, BGP is entitled to designate one individual to serve as a member of our Board unless BGP's ownership of our Common Stock falls below 10%.

JAMES M. LAPEYRE, JR. Director since 1998

Mr. Lapeyre, age 67, served as Chairman of our Board from 1999 until January 1, 2012, and again from January 1, 2013 until present. During 2012, Mr. Robert P. Peebler held the role of Executive Chairman and Mr. Lapeyre served as Lead Independent Director. Mr. Lapeyre has been President and Manager of Laitram L.L.C., a privately-owned, New Orleans-based manufacturer of food processing equipment and modular conveyor belts, and its predecessors, since 1989. Mr. Lapeyre joined our Board when we bought the DigiCOURSE marine positioning products business from Laitram in 1998. Mr. Lapeyre is a member of the Audit, Compensation, Governance and Finance Committees of our Board. He holds a Bachelor of Art degree in history from the University of Texas and Master of Business Administration and Juris Doctorate degrees from Tulane University.

Mr. Lapeyre's status as a significant shareholder of our Company enables our Board to have direct access to the perspective of our shareholders and ensures that the Board will take into consideration the interests of our shareholders in all Board decisions. In addition, Mr. Lapeyre has extensive knowledge regarding the marine products and technology that we acquired from Laitram in 1998.

Class II Director—Term Expiring In 2022

DAVID H. BARR Director since 2010

From May 2011 until December 2012, Mr. Barr, age 70, served as the President and Chief Executive Officer of Logan International Inc., a Calgary-based Toronto Stock Exchange (TSX)-listed manufacturer and provider of oilfield tools and services. In 2009, Mr. Barr retired from Baker Hughes Incorporated, an oilfield services and equipment provider, after serving for 36 years in various manufacturing, marketing, engineering and product management functions. At the time of his retirement, Mr. Barr was Group President—Eastern Hemisphere, responsible for all Baker Hughes products and services for Europe, Russia/Caspian, Middle East, Africa and Asia Pacific. From 2007 to 2009, he served as Group President—Completion & Production, and from 2005 to 2007, as Group President—Drilling and Evaluation. Mr. Barr served as President of Baker Atlas, a division of Baker Hughes Inc., from 2000 to 2005, and served as Vice President, Supply Chain Management for the Cameron division of Cameron International Corporation from 1999 to 2000. Prior to 1999, he held positions of increasing responsibility within Baker Hughes Inc. and its affiliates, including Vice President—Business Process Development and various leadership positions with Hughes Tool Company and Hughes Christensen. Mr. Barr initially joined Hughes Tool Company in 1972 after graduating from Texas Tech University with a Bachelor of Science degree in mechanical engineering. He formerly served on the Board of Directors, Compensation Committee, and as Chairman of the Safety and Social Responsibility Committee of Enerplus Corporation (a NYSE- and TSX-listed independent oil and gas exploration and production ("E&P") company), on the Board of Directors and Compensation Committee of Logan International Inc., and on the Board of Directors and Audit, Remuneration and Governance Committees of Hunting PLC, a London Stock Exchange-listed provider of energy services. Mr. Barr is the chairman of our Compensation Committee and a member of the Governance Committee of our Board.

Mr. Barr's years of experience in the oilfield equipment and services industry provides a uniquely valuable industry perspective for our Board. While at Baker Hughes, Mr. Barr obtained experience within a wide range of company functions, from engineering to group President. His breadth of experience enables him to better understand and inform the Board regarding a range of issues and decisions involved in the operation of our business, including development of business strategy.

MICHAEL McGOVERN Director since 2019

Mr. McGovern, age 68, joined ION's Board of Directors in June 2019 and is also a member of the Compensation Committee. He is currently Chairman and CEO of Sherwood Energy, LLC, a private company focused on aggregating hydrocarbon reserves through ownership of working interests in oil and natural gas leases. Mr. McGovern serves on the board of Cactus, Inc. (NYSE: WHD), a manufacturer and designer of wellheads and pressure control equipment, Nuverra Environmental Solutions (NYSE: NES), which provides delivery, recycling and disposal of materials generated in shale oil production, Fibrant LLC served on a private company who was a manufacturer of Caprolactam from April 2016 to June 2019. He holds a Bachelor of Science degree in Business from Centenary College of Louisiana.

Mr. McGovern has extensive experience in oil and gas, and has served as a director and as an executive at multiple public and private companies. His energy and technology experience will be especially valuable as we execute on our long-term strategic vision, expand into new markets and continue to lead in delivering tools that empower data-driven decision making.

S. JAMES NELSON, JR. Director since 2004

Mr. Nelson, age 78, joined our Board in 2004. In 2004, Mr. Nelson retired from Cal Dive International, Inc. (now named Helix Energy Solutions Group, Inc.), a marine contractor and operator of offshore oil and gas properties and production facilities, where he was a founding shareholder, Chief Financial Officer (prior to 2000), Vice Chairman (from 2000 to 2004) and a Director (from 1990 to 2004). From 1985 to 1988, Mr. Nelson was the Senior Vice President and Chief Financial Officer of Diversified Energies, Inc., a NYSE-traded company with $1 billion in annual revenues and the former parent company of Cal Dive. From 1980 to 1985, Mr. Nelson served as Chief Financial Officer of Apache Corporation, an oil and gas E&P company. From 1966 to 1980, Mr. Nelson was employed with Arthur Andersen & Co. where, from 1976 to 1980, he was a partner serving on the firm's worldwide oil and gas industry team. Mr. Nelson also currently serves on the Board of Directors and Audit Committees of Oil States International, Inc. (a NYSE-listed diversified oilfield services company) and W&T Offshore, Inc. (a NYSE-listed oil and natural gas E&P company), where he was appointed to the Governance Committee in late 2016. From 2010 until October 2012, Mr. Nelson also served on the Board of Directors and Audit and Compensation Committees of the general partner of Genesis Energy LP, an operator of oil and natural gas pipelines and provider of services to refineries and industrial gas users. From 2005 until the Company's sale in 2008, he served as a member of the Board of Directors, a member of the Compensation Committee and Chair of the Audit Committee of Quintana Maritime, Ltd., a provider of dry bulk cargo shipping services based in Athens, Greece. Mr. Nelson, who is also a Certified Public Accountant, is Chairman of the Audit and Finance Committees of our Board. He holds a Bachelor of Science degree in accounting from Holy Cross College and a Master of Business Administration degree from Harvard University.

Mr. Nelson is an experienced financial leader with the skills necessary to lead our Audit Committee. His service as Chief Financial Officer of Cal Dive International, Inc., Diversified Energies, Inc. and Apache Corporation, as well as his years with Arthur Andersen & Co., make him a valuable asset to ION, both on our Board and as the Chairman of our Audit Committee, particularly with regard to financial and accounting matters. In addition, Mr. Nelson's service on audit committees of other companies enables Mr. Nelson to remain current on audit committee best practices and current financial reporting developments within the energy industry.

BOARD OF DIRECTORS AND CORPORATE GOVERNANCE

Governance Initiatives. ION is committed to excellence in corporate governance and maintains clear practices and policies that promote good corporate governance. We review our governance practices and update them, as appropriate, based upon Delaware law, rules and listing standards of the NYSE, SEC regulations and practices recommended by our outside advisors.

Examples of our corporate governance initiatives include the following:

- Seven of our eight Board members are independent of ION and its management. Christopher T. Usher, our President and Chief Executive Officer, is not independent because he is an employee of ION.
- All members of the principal standing committees of our Board—the Audit Committee, the Governance Committee and the Compensation Committee—are independent.
- The independent members of our Board and each of the principal committees of our Board meet regularly without the presence of management. The members of the Audit Committee meet regularly with representatives of our independent registered public accounting firm without the presence of management. The members of the Audit Committee also meet regularly with our Director of Internal Audit without the presence of other members of management.
- Our Audit Committee has at least two members who qualify as a "financial expert" in accordance with Section 407 of the Sarbanes-Oxley Act of 2002.
- The Board has adopted written Corporate Governance Guidelines to assist its members in fulfilling their responsibilities.
- Under our Corporate Governance Guidelines, Board members are required to offer their resignation from the Board if they retire or materially change the position they held when they began serving as a director on the Board.
- We comply with and operate in a manner consistent with regulations prohibiting loans to our directors and executive officers.
- Members of our Disclosure Committee, consisting of management employees and senior finance and accounting employees, must review and confirm they have reviewed all quarterly and annual reports before filing with the SEC.
- We have a dedicated hotline and website available to all employees to report ethics and compliance concerns, anonymously if preferred, including concerns related to accounting, accounting controls, financial reporting and auditing matters. The hotline and website are administered and monitored by an independent hotline monitoring company. The Board has adopted a policy and procedures for the receipt, retention and treatment of complaints and employee concerns received through the hotline or website. The policy is available on our website at *http://ir.iongeo.com/phoenix.zhtml?c=101545&p=irol-govhighlights*.
- On an annual basis, each director and each executive officer is obligated to complete a questionnaire that requires disclosure of any transactions with ION in which the director or executive officer, or any member of his or her immediate family, has a direct or indirect material interest.
- We have included as Exhibits 31.1 and 31.2 to our Annual Report on Form 10-K for the fiscal year ended December 31, 2019, filed with the SEC, certificates of our Chief Executive Officer and Chief Financial Officer, respectively, certifying as to the quality of our public disclosure. In addition, in 2019, we submitted to the NYSE a certificate of our Chief Executive Officer

certifying that he is not aware of any violation by ION of the NYSE corporate governance listing standards.

- Our internal audit controls function maintains critical oversight over the key areas of our business and financial processes and controls, and provides reports directly to the Audit Committee.
- We have a compensation recoupment (clawback) policy that applies to our current and former executive officers. The policy is available on our website at *http://ir.iongeo.com/phoenix.zhtml?c=101545&p=irol-govhighlights*.
- We have stock ownership guidelines for our non-employee directors and senior management.
- Our employment contract with our Chief Executive Officer and other employees do not contain a "single-trigger" change of control severance provision or entitle the employee to tax gross-up benefits.

Majority Voting Procedure for Directors. Our Corporate Governance Guidelines require a mandatory majority voting, director resignation procedure. Any director nominee in an uncontested election who receives a greater number of votes "withheld" from his or her election than votes "for" such election is required to promptly tender to the Board his or her resignation following certification of the shareholder vote. Upon receipt of the resignation, the Governance Committee will consider the resignation offer and recommend to the Board whether to accept it. The Board will act on the Governance Committee's recommendation within 120 days following certification of the shareholder vote. The Governance Committee and the Board may consider any factors they deem relevant in deciding whether to accept a director's resignation. Thereafter, the Board will promptly disclose its decision whether to accept the director's resignation offer (and the reasons for rejecting the resignation offer, if applicable) in a Current Report on Form 8-K furnished to the SEC.

Code of Ethics. We have adopted a Code of Ethics that applies to all members of our Board and all of our employees, including our principal executive officer, principal financial officer, principal accounting officer and all other senior members of our finance and accounting departments. An updated version of our Code of Ethics was approved by the Board on November 4, 2014. We require all employees to adhere to our Code of Ethics in addressing legal and ethical issues encountered in conducting their work. The Code of Ethics requires that our employees avoid conflicts of interest, comply with all laws and other legal requirements, conduct business in an honest and ethical manner, promote full and accurate financial reporting and otherwise act with integrity and in ION's best interest. Every year our senior management employees and senior finance and accounting employees affirm their compliance with our Code of Ethics and other principal compliance policies. New employees acknowledge receipt and compliance with Company policies through an online onboarding portal, after the employment offer has been accepted.

We have made our Code of Ethics, Corporate Governance Guidelines, charters for the principal standing committees of our Board and other information that may be of interest to investors available on the Investor Relations section of our website at *http://ir.iongeo.com/phoenix.zhtml?c=101545&p=irol-govhighlights.* Copies of this information may also be obtained by writing to us at ION Geophysical Corporation, Attention: Corporate Secretary, 2105 CityWest Boulevard, Suite 100, Houston, Texas 77042-2855. Amendments to, or waivers from, our Code of Ethics will also be available on our website and reported as may be required under SEC rules; however, any technical, administrative or other non-substantive amendments to our Code of Ethics may not be posted.

Please note that the preceding Internet address and all other Internet addresses referenced in this Proxy Statement are for information purposes only and are not intended to be a hyperlink. Accordingly, no information found or provided at such Internet addresses or at our website in general is intended or deemed to be incorporated by reference herein.

Lead Independent Director. James M. Lapeyre, Jr. serves as our Chairman of the Board. Under NYSE corporate governance listing standards, Mr. Lapeyre has also been designated as our Lead Independent Director and presiding non-management director to lead non-management directors meetings of the Board. Our non-management directors meet at regularly scheduled executive sessions without management, over which Mr. Lapeyre presides. The powers and authority of the Lead Independent Director also include the following:

- Advise and consult with the Chief Executive Officer, senior management and the Chairperson of each Committee of the Board, as to the appropriate information, agendas and schedules of Board and Committee meetings;
- Advise and consult with the Chief Executive Officer and senior management as to the quality, quantity and timeliness of the information submitted by the Company's management to the independent directors;
- Recommend to the Chief Executive Officer and the Board the retention of advisers and consultants to report directly to the Board;
- Call meetings of the Board or executive sessions of the independent directors;
- Develop the agendas for and preside over executive sessions of the Board's independent directors;
- Serve as principal liaison between the independent directors, and the Chief Executive Officer and senior management, on sensitive issues, including the review and evaluation of the Chief Executive Officer; and
- Coordinate with the independent directors in respect of each of the foregoing.

Certain of the duties and powers described above are to be conducted in conjunction with our Chairman of the Board if the Lead Independent Director is not also the Chairman of the Board.

Communications to Board and Lead Independent Director. Shareholders and other interested parties may communicate with the Board and our Lead Independent Director or non-management independent directors as a group by writing to "Chairman of the Board" or "Lead Independent Director," c/o Corporate Secretary, ION Geophysical Corporation, 2105 CityWest Boulevard, Suite 100, Houston, Texas 77042-2855. Inquiries sent by mail will be reviewed by our Corporate Secretary and, if they pertain to the functions of the Board or committees of the Board or if the Corporate Secretary otherwise determines that they should be brought to the intended recipient's attention, they will be forwarded to the intended recipient. Concerns relating to accounting, internal controls, auditing or compliance matters will be brought to the attention of our Audit Committee and handled in accordance with procedures established by the Audit Committee.

Our Corporate Secretary's review of these communications will be performed with a view that the integrity of this process be preserved. For example, items that are unrelated to the duties and responsibilities of the Board, such as personal employee complaints, product inquiries, new product suggestions, resumes and other forms of job inquiries, surveys, service or product complaints, requests for donations, business solicitations or advertisements, may not be forwarded to the directors. In addition, material that is considered to be hostile, threatening, illegal or similarly unsuitable may not be forwarded. Except for these types of items, the Corporate Secretary will promptly forward written communications to the intended recipient. Within the above guidelines, the independent directors have granted the Corporate Secretary discretion to decide what correspondence should be shared with ION management and independent directors.

2019 Meetings of the Board and Shareholders. During 2019, the Board held a total of seven meetings (including regularly scheduled and special meetings) and the four standing committees of the Board held a total of 31 meetings. The rate of attendance by our directors at all board meetings and committee meeting (for those committees on which a director serverd) was 92%. We do not require our Board members to attend our Annual Meeting of Shareholders; however, five out of seven of our directors were present at our Annual Meeting held in May 2019.

Each director attended more than seventy-five percent (75%) of the aggregate of the total number of meetings of the Board, and the total number of meetings held by all committees of the Board on which he or she served, with the exception of Mr. HuaSheng Zheng, who attended three out of seven meetings of the Board. Mr. Zheng does not serve on any committees.

Independence. In determining independence, each year the Board determines whether directors have any "material relationship" with ION. When assessing the "materiality" of a director's relationship with ION, the Board considers all relevant facts and circumstances, not merely from the director's standpoint, but from that of the persons or organizations with which the director has an affiliation, and the frequency or regularity of the services, whether the services are being carried out at arm's length in the ordinary course of business and whether the services are being provided substantially on the same terms to ION as those prevailing at the time from unrelated parties for comparable transactions. Material relationships can include commercial, banking, industrial, consulting, legal, accounting, charitable and familial relationships. Factors that the Board may consider when determining independence for purposes of this determination include (1) not being a current employee of ION or having been employed by ION within the last three years; (2) not having an immediate family member who is, or who has been within the last three years, an executive officer of ION; (3) not personally receiving or having an immediate family member who has received, during any 12-month period within the last three years, more than $120,000 per year in direct compensation from ION other than director and committee fees; (4) not being employed or having an immediate family member employed within the last three years as an executive officer of another company of which any current executive officer of ION serves or has served, at the same time, on that company's compensation committee; (5) not being an employee of or a current partner of, or having an immediate family member who is a current partner of, a firm that is ION's internal or external auditor; (6) not having an immediate family member who is a current employee of such an audit firm who personally works on ION's audit; (7) not being or having an immediate family member who was within the last three years a partner or employee of such an audit firm and who personally worked on ION's audit within that time; (8) not being a current employee, or having an immediate family member who is a current executive officer, of a company that has made payments to, or received payments from, ION for property or services in an amount that, in any of the last three fiscal years, exceeds the greater of $1 million or 2% of the other company's consolidated gross revenues; or (9) not being an executive officer of a charitable organization to which, within the preceding three years, ION has made charitable contributions in any single fiscal year that has exceeded the greater of $1 million or 2% of such organization's consolidated gross revenues.

Our Board has affirmatively determined that, with the exception of Christopher T. Usher, who is our President and Chief Executive Officer and an employee of ION, no director has a material relationship with ION within the meaning of the NYSE's listing standards, and that each of our directors (other than Mr. Usher) is independent from management and from our independent registered public accounting firm, as required by NYSE listing standard rules regarding director independence.

Our Chairman and Lead Independent Director, Mr. Lapeyre, is an executive officer and significant shareholder of Laitram, L.L.C., a company with which ION has ongoing contractual relationships, and Mr. Lapeyre and Laitram together owned approximately 9.5% of our outstanding Common Stock as of February 28, 2020. Our Board has determined that these contractual relationships have not interfered with Mr. Lapeyre's demonstrated independence from our management, and that the services performed by Laitram for ION are being provided at arm's length in the ordinary course of business and substantially on the same terms to ION as those prevailing at the time from unrelated parties for comparable transactions. In addition, the services provided by Laitram to ION resulted in payments by ION to Laitram in an amount less than 1% of Laitram's 2019 consolidated gross revenues. As a result of these factors, our Board has determined that Mr. Lapeyre, along with each of our other non-management directors, is independent within the meaning of the NYSE's director independence standards. For an explanation of the contractual relationship between Laitram and ION, please see "*—Certain Transactions and Relationships*" below.

Our director, Mr. Zheng, is employed as Executive Vice President of BGP. For an explanation of the relationships between BGP and ION, please see "*—Certain Transactions and Relationships*" below.

Risk Oversight. Our Board oversees an enterprise-wide approach to risk management, designed to support the achievement of organizational objectives, including strategic objectives, to improve long-term organizational performance and enhance shareholder value. A fundamental part of risk management is not only understanding the risks a company faces and what steps management is taking to manage those risks, but also understanding what level of risk is appropriate for the Company. The involvement of the full Board in setting ION's business strategy is a key part of its assessment of the Company's appetite for risk and also a determination of what constitutes an appropriate level of risk for the Company. The Board also regularly reviews information regarding the Company's credit, liquidity and operations, as well as the risks associated with each. While the Board has the ultimate oversight responsibility for the risk management process, various committees of the Board also have responsibility for risk management. In particular, the Audit Committee focuses on financial risk, including internal controls, and receives an annual risk assessment report from ION's internal auditors. The Audit Committee is also responsible for overseeing cybersecurity-related risks. In addition, in setting compensation, the Compensation Committee strives to create incentives that encourage a level of risk-taking behavior consistent with ION's business strategies. While each committee is responsible for evaluating certain risks and overseeing the management of such risks, the entire Board is regularly informed through committee reports about such risks.

Board Leadership. Our current Board leadership structure consists of a Chairman of the Board (who is not our current CEO), a Lead Independent Director (who is also our Chairman of the Board) and strong independent committee chairs. The Board believes this structure provides independent Board leadership and engagement and strong independent oversight of management while providing the benefit of having our Chairman and Lead Independent Director lead regular Board meetings as we discuss key business and strategic issues. Mr. Lapeyre, a non-employee independent director, serves as our Chairman of the Board and Lead Independent Director. Mr. Usher has served as our CEO since June 1, 2019. We separate the roles of CEO and Chairman of the Board in recognition of the differences between the two roles. The CEO is responsible for setting the strategic direction for the Company and the day-to-day leadership and performance of the Company, while the Chairman provides guidance to the CEO and sets the agenda for Board meetings and presides over the meetings of the full Board. Separating these positions allows our CEO to focus on our day-to-day business, while allowing the Chairman to lead the Board in its fundamental role of providing advice to, and independent oversight of, management. The Board recognizes the time, effort and energy that the CEO is required to devote to his position, as well as the commitment required to serve as our Chairman. The Board believes that having separate positions is the appropriate leadership structure for our Company at this time and demonstrates our commitment to good corporate governance.

Political Contributions and Lobbying. Our Code of Ethics prohibits company contributions to political candidates or parties. In addition, we do not advertise in or purchase political publications, allow company assets to be used by political parties or candidates, use corporate funds to purchase seats at political fund raising events, or allow company trademarks to be used in political or campaign literature. ION is a member of certain trade associations that may use a portion of their membership dues for lobbying and/or political expenditures.

Committees of the Board

The Board has established four standing committees to facilitate and assist the Board in the execution of its responsibilities. The four standing committees are the Audit Committee, the Compensation Committee, the Governance Committee and the Finance Committee. Each standing committee operates under a written charter, which sets forth the functions and responsibilities of the committee. A copy of the charter for each of the Audit Committee, the Compensation Committee and the Governance Committee can be obtained by writing to us at ION Geophysical Corporation, Attention: Corporate Secretary, 2105 CityWest Boulevard, Suite 100, Houston, Texas 77042-2855 and can also be viewed on our website at *http://ir.iongeo.com/phoenix.zhtml?c=101545&p=irol-govhighlights*. The Audit Committee, Compensation Committee, Governance Committee and Finance Committee are composed entirely of non-employee directors. In addition, the Board establishes temporary special committees from time to time on an as-needed basis. During 2019, the Audit Committee met five times, the Compensation Committee met eight times, the Governance Committee met thirteen times. The Finance Committee did not meet.

The current members of the four standing committees of the Board are identified below.

Director	Compensation Committee	Audit Committee	Governance Committee	Finance Committee
James M. Lapeyre, Jr.	*	*	*	*
David H. Barr	Chair		*	
Michael McGovern	*			
S. James Nelson, Jr.		Chair		Chair
John N. Seitz	*		Chair	*
Christopher T. Usher				
Tina Wininger		*		
HuaSheng Zheng				

* Member

Audit Committee

The Audit Committee is a separately-designated standing audit committee as defined in Section 3(a)(58)(A) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). The Audit Committee oversees matters relating to financial reporting, internal controls, risk management and compliance. These responsibilities include appointing, overseeing, evaluating and approving the fees of our independent auditors, reviewing financial information that is provided to our shareholders and others, reviewing with management our system of internal controls and financial reporting processes, and monitoring our compliance program and system.

The Board has determined that each member of the Audit Committee is financially literate and satisfies the definition of "independent" as established under the NYSE corporate governance listing standards and Rule 10A-3 under the Exchange Act. In addition, the Board has determined that each of Mr. Nelson, the Chairman of the Audit Committee, and Ms. Wininger, is qualified as an audit committee financial expert within the meaning of SEC regulations, and that each has accounting and related financial management expertise within the meaning of the listing standards of the NYSE and Rule 10A-3.

Compensation Committee

General. The Compensation Committee has responsibility for the compensation of our executive officers, including our Chief Executive Officer, and the administration of our executive compensation and benefit plans. The Compensation Committee also has authority to retain or replace outside counsel, compensation and benefits consultants or other experts to provide it with independent advice, including the authority to approve the fees payable and any other terms of retention. All actions regarding named executive officer compensation require Compensation Committee approval. The Compensation Committee completes a comprehensive review of all elements of compensation at least annually. If it is determined that any changes to any executive officer's total compensation are necessary or appropriate, the Compensation Committee obtains such input from management as it determines to be necessary or appropriate. All compensation decisions with respect to executives other than our Chief Executive Officer are determined in discussion with, and frequently based in part upon the recommendation of, our Chief Executive Officer. The Compensation Committee makes all determinations with respect to the compensation of our Chief Executive Officer, including, but not limited to, establishing performance objectives and criteria related to the payment of his compensation, and determining the extent to which such objectives have been established, obtaining such input from the Compensation Committee's independent compensation advisors as it deems necessary or appropriate.

As part of its responsibility to administer our executive compensation plans and programs, the Compensation Committee, usually near the beginning of the calendar year, establishes the parameters of the annual incentive plan awards, including the performance goals relative to our performance that will be applicable to such awards and the similar awards for our other senior executives. It also reviews our performance against the objectives established for awards payable in respect of the prior calendar year, and confirms the extent, if any, to which such objectives have been obtained, and the amounts payable to each of our executive officers in respect of such achievement.

The Compensation Committee also determines the appropriate level and type of awards, if any, to be granted to each of our executive officers pursuant to our equity compensation plans, and approves the total annual grants to other key employees, to be granted in accordance with a delegation of authority to a corporate human resources officer or other Company officer.

The Compensation Committee reviews, and has the authority to recommend to the Board for adoption, any new executive compensation or benefit plans that are determined to be appropriate for adoption by ION, including those that are not otherwise subject to the approval of our shareholders. It reviews any contracts with current or former elected officers of the corporation. In connection with the review of any such contract, the Compensation Committee may seek from its independent advisors such advice, counsel and information as it determines to be appropriate in the conduct of such review. The Compensation Committee will direct such outside advisors as to the information it requires in connection with any such review, including data regarding competitive practices among the companies with which ION generally compares itself for compensation purposes.

Compensation Committee Interlocks and Insider Participation. The Board has determined that each member of the Compensation Committee satisfies the definition of "independent" as established under the NYSE corporate governance listing standards. No member of the Compensation Committee is, or was during 2019, an officer or employee of ION. Mr. Lapeyre is President and Manager and a significant equity owner of Laitram, L.L.C, which has had a business relationship with ION since 1999. During 2019, the Company paid Laitram and its affiliates $0.7 million for manufacturing and related services in connection with the Company's Louisiana marine operations. In addition, beginning in 2019, the Company subleased approximately 47,800 square feet of office space to Laitram. See *"—Certain Transactions and Relationships"* below.

During 2019:

- No executive officer of ION served as a member of the compensation committee of another entity, one of whose executive officers served as a director or on the Compensation Committee of ION; and

- No executive officer of ION served as a director of another entity, one of whose executive officers served on the Compensation Committee of ION.

Governance Committee

The Governance Committee functions as the Board's nominating and corporate governance committee and advises the Board with regard to matters relating to governance practices and policies, management succession, and composition and operation of the Board and its committees, including reviewing potential candidates for membership on the Board and recommending to the Board nominees for election as directors of ION. In addition, the Governance Committee reviews annually with the full Board and our Chief Executive Officer the succession plans for senior executive officers and makes recommendations to the Board regarding the selection of individuals to occupy these positions. The Board has determined that each member of the Governance Committee satisfies the definition of "independent" as established under the NYSE corporate governance listing standards.

In identifying and selecting new director candidates, the Governance Committee considers the Board's current and anticipated strengths and needs and a candidate's experience, knowledge, skills, expertise, integrity, diversity, ability to make independent analytical inquiries, understanding of our Company's business environment, willingness to devote adequate time and effort to Board responsibilities, and other relevant factors. The Governance Committee has not established specific minimum age, education, years of business experience, or specific types of skills for potential director candidates, but, in general, expects that qualified candidates will have ample experience and a proven record of business success and leadership. The Governance Committee also seeks an appropriate balance of experience and expertise in accounting and finance, technology, management, international business, compensation, corporate governance, strategy, industry knowledge and general business matters. In addition, the Governance Committee seeks diversity on our Board, including diversity of experience, professions, skills, geographic representation, and backgrounds. The committee may rely on various sources to identify potential director nominees, including input from directors, management and others the Governance Committee feels are reliable, and professional search firms. In 2018, our Board engaged Heidrick & Struggles to assist in a search for potential new director candidates, with a particular emphasis on increasing the gender diversity of our Board, and in 2019, this search culminated with the election of Ms. Tina Wininger to the Board, and her appointment to the Audit Committee.

Our Bylaws permit shareholders to nominate individuals for director for consideration at an annual shareholders' meeting. A proper director nomination may be considered at our 2021 Annual Meeting only if the proposal for nomination is received by ION no later than December 20, 2020. All nominations should be directed to Corporate Secretary, ION Geophysical Corporation, 2105 CityWest Boulevard, Suite 100, Houston, Texas 77042-2855.

The Governance Committee will consider properly submitted recommendations for director nominations made by a shareholder or other sources (including self-nominees) on the same basis as other candidates. For consideration by the Governance Committee, a recommendation of a candidate must be submitted timely and in writing to the Governance Committee in care of our Corporate Secretary at our principal executive offices. The submission must include sufficient details regarding the qualifications of the potential candidate. In general, nominees for election should possess (1) the highest level of integrity and ethical character, (2) strong personal and professional reputation, (3) sound judgment, (4) financial literacy, (5) independence, (6) significant experience and proven superior performance in professional endeavors, (7) an appreciation for Board and team performance, (8) the commitment to devote the time necessary, (9) skills in areas that will benefit the Board and (10) the ability to make a long-term commitment to serve on the Board.

Finance Committee

From time to time, the Finance Committee reviews, with ION management, and has the power and authority to approve on behalf of the Board, ION's strategies, plans, policies and actions related to corporate finance, including, but not limited to, (a) capital structure plans and strategies and specific equity or debt financings, (b) capital expenditure plans and strategies and specific capital projects, (c) strategic and financial investment plans and strategies and specific investments, (d) cash management plans and strategies and activities relating to cash flow, cash accounts, working capital, cash investments and treasury activities, including the establishment and maintenance of bank, investment and brokerage accounts, (e) financial aspects of insurance and risk management, (f) tax planning and compliance, (g) dividend policy, (h) plans and strategies for managing foreign currency exchange exposure and other exposures to economic risks, including plans and strategies with respect to the use of derivatives, and (i) reviewing and making recommendations to the Board with respect to any proposal by ION to divest any asset, investment, real or personal property, or business interest if such divestiture is required to be approved by the Board. The Finance Committee does not have oversight responsibility with respect to ION's financial reporting, which is the responsibility of the Audit Committee. The Board has determined that each member of the Finance Committee (including its Chairman) satisfies the definition of "independent" as established under the NYSE corporate governance listing standards.

Stock Ownership Requirements

The Board has adopted stock ownership requirements for ION's directors. The Board adopted these requirements in order to align the economic interests of the directors with those of our shareholders and further focus our emphasis on enhancing shareholder value. Under these requirements, each non-employee director is expected to own at least 7,500 shares of Common Stock, which, at the $8.68 closing price per share of our Common Stock on the NYSE on December 31, 2019 equates to approximately 142% of the $46,000 annual retainer fee we pay to our non-employee directors. Directors have three years to acquire and increase the director's ownership of ION Common Stock to satisfy the requirements. The stock ownership requirements are subject to modification by the Board in its discretion. The Board has also adopted stock ownership requirements for senior management of ION. See *"Executive Compensation—Compensation Discussion and Analysis—Elements of Compensation—Stock Ownership Requirements; Hedging Policy"* below.

The Governance Committee and the Board regularly review and evaluate ION's directors' compensation program on the basis of current and emerging compensation practices for directors, emerging legal, regulatory and corporate compliance developments and comparisons with director compensation programs of other similarly-situated public companies.

Certain Transactions and Relationships

The Board has adopted a policy to be followed prior to any transaction, arrangement or relationship, or series of similar transactions, arrangements or relationships, including any indebtedness or guarantee of indebtedness, between ION and a "Related Party" where the aggregate amount involved is expected to exceed $120,000 in any calendar year. Under the policy, "Related Party" includes (a) any person who is or was an executive officer, director or nominee for election as a director (since the beginning of the last fiscal year); (b) any person or group who is a greater-than-5% beneficial owner of ION voting securities; or (c) any immediate family member of any of the foregoing, which means any child, stepchild, parent, stepparent, spouse, sibling, mother-in-law, father-in-law, son-in-law, daughter-in-law, brother-in-law, sister-in-law, and anyone residing in the home of an executive officer, director or nominee for election as a director (other than a tenant or employee). Under the policy, the Audit Committee of the Board is responsible for reviewing the material facts of any Related Party transaction and approving or ratifying the transaction. In making its determination to approve or ratify, the Audit Committee is required to consider such factors as (i) the extent of the Related Party's interest in the transaction, (ii) if applicable, the availability of other sources of comparable products or services, (iii) whether the terms of the Related Party transaction are no less favorable than terms generally available in unaffiliated transactions under like circumstances, (iv) the benefit to ION and (v) the aggregate value of the Related Party transaction.

Mr. Lapeyre is the President and Manager and a significant equity owner of Laitram, L.L.C. ("Laitram") and has served as President and Manager 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 9.5% of our outstanding Common Stock as of February 28, 2020. Mr. Lapeyre also holds approximately $2 million (face value) of our 9.125% Senior Secured Second Priority Notes due 2021.

We acquired DigiCourse, Inc., our marine positioning products business, from Laitram in 1998. In connection with that acquisition, we entered into a Continued Services Agreement with Laitram under which Laitram agreed to provide us certain bookkeeping, software, manufacturing, and maintenance services. Manufacturing services consist primarily of machining of parts for our marine positioning systems. The term of this agreement expired in September 2001 but we continue to operate under its terms. In addition, from time to time, when we have requested, the legal staff of Laitram has advised us on certain intellectual property matters with regard to our marine positioning systems. During 2019, the Company paid Laitram and its affiliates $0.7 million, which consisted of manufacturing services and reimbursement of costs in connection with our marine devices business. During 2018 and 2017, the Company paid less than $0.1 million in each year for reimbursement for costs related to providing administrative and other back-office support services in connection with the Company's Louisiana marine operations.

In addition, beginning in April of 2019, the Company subleased approximately 47,800 square feet of building space to Laitram. In the opinion of the Company's management, the terms of these services were 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.

Mr. Zheng is Executive Vice President of BGP, which has been a customer of our products and services for many years. For 2019 and 2018, the Company recorded revenues from BGP of $2.2 million and $4.9 million, respectively. Receivables due from BGP were $1.5 million and $1.6 million at December 31, 2019 and 2018, respectively.

In March 2010, prior to Mr. Zheng being appointed to the Board, we entered into certain transactions with BGP that resulted in the commercial relationships between our Company and BGP as described below:

- We issued and sold approximately 1,585,969 shares of our Common Stock to BGP for an effective purchase price of $42.00 per share pursuant to (i) a Stock Purchase Agreement we entered into with BGP and (ii) the conversion of the principal balance of indebtedness outstanding under a Convertible Promissory Note dated as of October 23, 2009. As of February 28, 2020, BGP held beneficial ownership of approximately 10.6% of our outstanding shares of Common Stock. The shares of our Common Stock acquired by BGP are subject to the terms and conditions of an Investor Rights Agreement that we entered into with BGP in connection with its purchase of our shares. Under the Investor Rights Agreement, for so long as BGP owns as least 10% of our outstanding shares of Common Stock, BGP will have the right to nominate one director to serve on our Board. The appointment of Mr. Zheng to our Board was made pursuant to this agreement. The Investor Rights Agreement also provides that whenever we may issue shares of our Common Stock or other securities convertible into, exercisable or exchangeable for our Common Stock, BGP will have certain pre-emptive rights to subscribe for a number of such shares or other securities as may be necessary to retain its proportionate ownership of our Common Stock that would exist before such issuance. These pre-emptive rights are subject to usual and customary exceptions, such as issuances of securities as equity compensation to our directors, employees and consultants and under employee stock purchase plans.

- We formed a joint venture with BGP, owned 49% by us and 51% by BGP, to design, develop, manufacture and sell land-based seismic data acquisition equipment for the petroleum industry. The name of the joint venture company is INOVA Geophysical Equipment Limited. Under the terms of the joint venture transaction, INOVA Geophysical was initially formed as a wholly-owned direct subsidiary of ION, and BGP acquired its interest in the joint venture by paying us aggregate consideration of (i) $108.5 million in cash and (ii) contributing certain assets owned by BGP relating to the business of the joint venture.

Director Compensation

ION employees who are also directors do not receive any fee or remuneration for services as members of our Board. We currently have seven non-employee directors who qualify for compensation as directors. In addition to being reimbursed for all reasonable out-of-pocket expenses that the director incurs attending Board meetings and functions, our outside directors receive an annual retainer fee of $46,000. In addition, our Chairman of the Board receives an annual retainer fee of $25,000, our Chairman of the Audit Committee receives an annual retainer fee of $20,000, our Chairman of the Compensation Committee receives an annual retainer fee of $15,000, our Chairman of the Governance Committee receives an annual retainer fee of $10,000 and our Chairman of the Finance Committee receives an annual retainer fee of $10,000. Our non-employee directors also receive, in cash, $2,000 for each Board meeting attended and $2,000 for each committee meeting attended (unless the committee meeting is held in conjunction with a Board meeting, in which case the fee for committee meeting attendance is $1,000) and $1,000 for each Board or committee meeting attended via teleconference.

Each non-employee director also receives an initial grant of 533 vested shares of our Common Stock on the first quarterly grant date after joining the Board and follow-on grants each year of a number of shares of our Common Stock equal in market value to $110,000, up to an annual grant of 2,500 shares per director. If the value of 2,500 shares, on the date of the grant, is less than $110,000, then each non-employee director receives the difference, in cash, in four quarterly payments.

In view of the serious markets downturn precipitated primarily by the COVID-19 pandemic, and in conjunction with the reduction in force, pay reductions and furloughs the Company undertook in 2020, the Board elected in April 2020 to reduce each of the above cash payments by 20% in 2020.

The following table summarizes the compensation earned by our non-employee directors in 2019:

Name(1)	Retainer and Meeting Fees Earned or Paid in Cash ($)	Stock Awards ($)(4)	Non-Equity Incentive Plan Compensation ($)	Change in Pension Value and Nonqualified Deferred Compensation Earnings ($)	All Other Compensation ($)(8)	Total ($)
David H. Barr	95,000	34,450**(5)**	—	—	66,381**(9)**	195,831
Michael C. Jennings**(2)**	5,000	—	—	—	9,719**(10)**	14,719
James M. Lapeyre, Jr.	109,000	34,450**(5)**	—	—	66,381**(9)**	209,831
Michael McGovern	48,984	16,968**(6)**	—	—	32,184**(11)**	98,166
Franklin Myers**(3)**	24,000	34,450**(5)**	—	—	28,606**(12)**	87,056
S. James Nelson, Jr.	92,000	34,450**(5)**	—	—	66,381**(9)**	192,831
John N. Seitz	89,000	34,450**(5)**	—	—	66,381**(9)**	189,831
Tina L. Wininger	49,000	17,479**(7)**	—	—	32,781**(13)**	99,946
HuaSheng Zheng	48,000	34,450**(5)**	—	—	69,069**(14)**	151,519

(1) Christopher T. Usher, our President and Chief Executive Officer, and R. Brian Hanson, who was President and CEO until June 1, 2019, are not included in this table because they each were employees of ION during 2019, and therefore received no compensation for their services as director. The compensation received by Messrs. Usher and Hanson as employees of ION during 2019 is shown in the Summary Compensation Table contained in "*—Executive Compensation*" below.

(2) Mr. Jennings resigned from the Board on February 8, 2019.

(3) Mr. Myers retired from the Board on June 17, 2019.

(4) For the last several years, each non-employee director has been granted an annual award of 2,500 shares of ION Common Stock from our Second Amended and Restated 2013 Long-Term Incentive Plan ("2013 LTIP") or Third Amended and Restated 2013 Long-Term Incentive Plan ("2018 LTIP"; the 2013 LTIP and the 2018 LTIP, collectively, the "LTIP"). This column shows the fair value of the grants made in 2019 (in each case using the closing price of the Company's Common Stock on the NYSE on the date of the grant or, where applicable, the first trading date thereafter).

(5) Received a grant on March 1, 2019. The value was calculated using the March 1, 2019 closing price on the NYSE of $13.78 per share.

(6) Mr. McGovern was elected to the Board on June 17, 2019. On September 1, 2019, he was granted his annual award of 1,760 shares (2,500 shares, pro-rated to reflect that he did not begin service until June 17). In addition to the foregoing annual grant, Mr. McGovern also received, on the same date, 533 shares of Common Stock, representing a one-time grant given to each director in connection with his initial appointment. The value was calculated using the September 3, 2019 closing price on the NYSE of $7.40 per share.

(7) Ms. Wininger was elected to the Board on June 7, 2019. On September 1, 2019, she was granted her annual award of 1,829 shares (2,500 shares, pro-rated to reflect that she did not begin service until June 7). In addition to the foregoing annual grant, Ms. Wininger received, on the same date, 533 shares of Common Stock, representing a one-time grant given to each director in connection with her initial appointment. The value was calculated using the September 3, 2019 closing price on the NYSE of $7.40 per share.

(8) As noted in footnote (4), each year, non-employee directors receive an annual grant of 2,500 shares of restricted stock, typically on March 1. In 2015, the Board approved an annual cash "true-up" such that, if the value of the 2,500 shares on the grant date is less than $110,000, each director will receive cash in an amount that, when added to the value of the grant, equals $110,000. The cash true-up is paid quarterly on June 1, September 1 and December 1 of the current year, and March 1 of the next following year. The column to which this footnote pertains shows the value of the cash true-ups paid to each director in 2019.

(9) Received a true-up payment of $9,719 on March 1, 2019 (in respect of his March 1, 2018 grant, which was valued at $71,125, based on the NYSE closing price, that day, of $28.45 per share), and $18,887.50 on each of June 1, September 1 and December 1, 2019 (in respect of his March 1, 2019 grant, valued as set forth in the table above).

(10) Received a true-up payment of $9,719 on March 1, 2019 (in respect of his March 1, 2018 grant, which was valued at $71,125, based on the NYSE closing price, that day, of $28.45 per share).

(11) Received true-up payments of $31,552 on September 1, and $662.10 on December 1, 2019, in respect of his September 1, 2019 grant of 1,760 shares. Mr. McGovern's pro-rated true up for this 2019 grant is $64,397.

(12) Received a true-up payment of $9,719 on March 1, 2019 (in respect of his March 1, 2018 grant, which was valued at $71,125, based on the NYSE closing price, that day, of $28.45 per share), and $18,887 on June 1, 2019 (in respect of his March 1, 2019 grant, valued as set forth in the table above).

(13) Received true-up payments of $33,467 on September 1, and $686 on December 1, 2019, in respect of her September 1, 2019 grant of 1,829 shares. Ms. Wininger's pro-rated true up for this 2019 grant is $66,247.

(14) Mr. Zheng, who joined the board on April, 13, 2018, received a true-up payment of $9,719 on March 1, 2019 (in respect of his pro-rated annual grant made on June 1, 2018, valued at $45,281, based on the NYSE closing price, that day, of $24.15 per share), and $18,887 on each of June 1, September 1, and December 1, 2019 (in respect of his March 1, 2019 grant, valued as set forth in the table above).

As of December 31, 2019, our non-employee directors held the following unvested and unexercised ION equity awards:

Name	Unvested Stock Awards(#)	Unexercised Option Awards(#)
David H. Barr	2,500	—
James M. Lapeyre, Jr.	2,500	—
Michael Y. McGovern	1,760	—
S. James Nelson, Jr.	2,500	—
John N. Seitz	2,500	—
Tina L. Wininger	1,829	—
HuaSheng Zheng	2,500	—

OWNERSHIP OF EQUITY SECURITIES OF ION

Except as otherwise set forth below, the following table sets forth information as of February 28, 2020, with respect to the number of shares of Common Stock owned by (i) each person known by us to be a beneficial owner of more than 5% of our Common Stock, (ii) each of our directors, (iii) each of our executive officers named in the 2019 Summary Compensation Table included in this Proxy Statement (except R. Brian Hanson, who left the Company in June, 2019) and (iv) all of our directors and executive officers named in the 2019 Summary Compensation Table (save for Mr. Hanson) as a group. Except where information was otherwise known by us, we have relied solely upon filings of Schedules 13D and 13G to determine the number of shares of our Common Stock owned by each person known to us to be the beneficial owner of more than 5% of our Common Stock as of such date.

Name of Owner	Common Stock(1)	Rights to Acquire(2)	Restricted Stock(3)	Percent of Common Stock(4)
BGP Inc., China National Petroleum Corporation(5)	1,585,969			10.6%
James M. Lapeyre, Jr.(6)	1,421,991		2,500	9.5%
Renaissance Technologies(7)	1,046,590			7.0%
Footprints Asset Management & Research, Inc.(8)	1,030,273			6.9%
Laitram, L.L.C.(9)	979,816			6.5%
Empery Asset Management, LP(10)	832,314			5.5%
Christopher T. Usher	62,893	39,163	219,430	2.1%
Kenneth G. Williamson	75,211	64,000	89,430	1.5%
David H. Barr	25,433		2,500	*
Michael Y. McGovern	533		1,760	*
S. James Nelson, Jr.	16,766		2,500	*
John N. Seitz	18,759		2,500	*
Tina L. Wininger	533		1,829	*
HuaSheng Zheng	1,685		2,500	*
Matthew R. Powers	11,470	24,166	42,443	*
Scott P. Schwausch	4,091	8,973	8,973	*
All directors and executive officers as a group (11 Persons)	1,639,365	136,302	377,003	14.2%

* Less than 1%

(1) Represents shares for which the named person (a) has sole voting and investment power or (b) has shared voting and investment power. Excluded are shares that (i) are unvested restricted stock holdings or (ii) may be acquired through stock option exercises.

(2) Represents shares of Common Stock that may be acquired upon the exercise of stock options held by our officers and directors that are currently exercisable or will be exercisable on or before April 29, 2020.

(3) Represents unvested shares subject to a vesting schedule, forfeiture risk and other restrictions. Although these shares are subject to risk of forfeiture, the holder has the right to vote the unvested shares unless and until they are forfeited.

(4) Assumes shares subject to outstanding stock options that such person has rights to acquire upon exercise, presently and on or before April 29, 2020, are outstanding.

(5) The address for BGP Inc., China National Petroleum Corporation is No. 189 Fanyang Middle Road, ZhuoZhou City, HeBei Province 072750 P.R. China.

(6) The shares of Common Stock held by Mr. Lapeyre include 129,402 shares that Mr. Lapeyre holds as a custodian or trustee for the benefit of his children, and 979,816 shares owned by

Laitram, L.L.C. (which are set forth in the table under Laitram, L.L.C.), in all of which Mr. Lapeyre disclaims any beneficial interest. Please read note 9 below. Mr. Lapeyre has sole voting power over only 315,273 of these shares of Common Stock.

(7) The address for Renaissance Technologies Holdings Corporation is 800 Third Avenue, New York, New York 10022.

(8) The address for Footprints Asset Management & Research, Inc. is 11422 Miracle Hills Drive, Suite 208 Omaha, NE 68154.

(9) The address for Laitram, L.L.C. is 220 Laitram Lane, Harahan, Louisiana 70123. Mr. Lapeyre is the President and Manager of Laitram. Please read note 6 above. Mr. Lapeyre disclaims beneficial ownership of any shares held by Laitram.

(10) The address for Empery Asset Management, LP is 1 Rockefeller Plaza, Suite 1205, New York, New York 10020.

Section 16(a) Beneficial Ownership Reporting Compliance

Section 16(a) of the Exchange Act requires directors and certain officers of ION, and persons who own more than 10% of ION's Common Stock, to file with the SEC and the NYSE initial statements of beneficial ownership on Form 3 and changes in such ownership on Forms 4 and 5. Based on our review of the copies of such reports, we believe that during 2019 our directors, executive officers and shareholders holding greater than 10% of our outstanding shares complied with all applicable filing requirements under Section 16(a) of the Exchange Act, and that all of their filings were timely made.

EXECUTIVE OFFICERS

Our executive officers are as follows:

Name	Age	Position with ION
Christopher T. Usher	59	President, Chief Executive Officer and Director
Michael L. Morrison	49	Executive Vice President and Chief Financial Officer (Interim)
Dale J. Lambert	61	Executive Vice President, Operations Optimization
Matthew R. Powers	44	Executive Vice President, General Counsel and Corporate Secretary
Scott P. Schwausch	45	Vice President, Corporate Controller and Chief Accounting Officer
Kenneth G. Williamson	55	Executive Vice President and Chief Operating Officer, E&P Technology & Services

For a description of the business background of Mr. Usher, please see *"Class I—Term Expiring in 2021"* above.

Mr. Morrison is currently our Executive Vice President and Chief Financial Officer (Interim). Prior to his appointment as Executive Vice President and Chief Financial Officer (Interim), Mr. Morrison exceled in a variety of senior positions in finance and accounting, mostly recently as Vice President of Finance and Treasurer, serving in that role since April 2016. Prior to serving as Vice President of Finance and Treasurer, Mr. Morrison served as Vice President of Finance (May 2013 - April 2016), Vice President and Corporate Controller (January 2007 - May 2013), Controller and Director of Accounting (November 2002 - January 2007) and Assistant Corporate Controller (June 2002 - November 2002). Since November 2016, Mr. Morrison has also served on the Board of Directors of INOVA Geophysical Equipment Limited, a joint venture between the Company and BGP. Prior to joining the Company in 2002, Mr. Morrison was a Director of Accounting providing transaction support for an energy trading company and held a variety of positions at Deloitte & Touche, LLP, a public accounting firm. Mr. Morrison is a Certified Public Accountant. He is a graduate of Texas A&M University with a Bachelor of Business Administration.

Mr. Williamson is our Executive Vice President and Chief Operating Officer, E&P Technology & Services. Mr. Williamson originally joined ION as Vice President of our GeoVentures business unit in September 2006, became a Senior Vice President in January 2007, and became Executive Vice President and Chief Operating Officer, GeoVentures Division, in November 2012 and Executive Vice President and Chief Operating Officer of E&P Technology & Services in February of 2015. Between 1987 and 2006, Mr. Williamson was employed by Western Geophysical, which in 2000 became part of WesternGeco, a seismic solutions and technology subsidiary of Schlumberger, Ltd., a global oilfield and information services company. While at WesternGeco, Mr. Williamson served as Vice President, Marketing from 2001 to 2003, Vice President, Russia and Caspian Region, from 2003 to 2005 and Vice President, Marketing, Sales & Commercialization of WesternGeco's electromagnetic services and technology division from 2005 to 2006. Mr. Williamson holds a Bachelor of Science degree in geophysics from Cardiff University in Wales.

Mr. Powers joined ION in 2013 as Senior Legal Counsel and held that position until February 2016 when he was promoted to Deputy General Counsel. In September 2017, he was promoted to General Counsel and Corporate Secretary, and was further promoted to Executive Vice President in October 2017. Prior to joining ION, Mr. Powers held a variety of positions in the Houston offices of Mayer Brown LLP (beginning in 2005 and ending in 2012) and Sidley Austin LLP (beginning in 2012 and ending in 2013). Mr. Powers holds a Juris Doctor from the University of Chicago Law School and a Bachelor's degree in Economics, summa cum laude, from the University of Colorado-Denver. He is licensed to practice in Texas.

Mr. Lambert is currently our Executive Vice President, Operations Optimization. Mr. Lambert has over 30 years of multi-disciplinary engineering and management experience leading the development and commercialization of multi-million dollar offshore products and systems. He is a significant contributor to ION's intellectual property portfolio, creating innovative solutions that meet the technical and business challenges of our clients.

Mr. Lambert began his career at Thompson Equipment Company, where he held various engineering and management roles spanning a decade that culminated in an EVP position responsible for engineering, sales, marketing and manufacturing. There he was involved in many automation projects involving early implementations of artificial intelligence. Next he became Engineering Manager for DigiCOURSE, which ION acquired in 1998. He held engineering positions with increasing levels of responsibility between 1998-2014 in ION's marine equipment group, where he oversaw R&D, product design and systems engineering. From 2015-2019, Mr. Lambert served as Senior Vice President and General Manager of ION's Marine Systems group. In 2020, he was promoted to Executive Vice President of our Operations Optimization group, which includes P&L responsibility for our software and equipment businesses. Mr. Lambert is a graduate of the University of New Orleans with a Master's in Engineering and Bachelor's in Electrical Engineering. He is a registered Professional Engineer in both Electrical and Controls Engineering.

Mr. Schwausch joined ION in 2006 as Assistant Controller and held that position until June 2010 when he became Director of Financial Reporting. In May 2012, he became Controller, Solutions Business Unit, and in May 2013 became Vice President and Corporate Controller. Mr. Schwausch held a variety of positions at Deloitte & Touche, LLP, a public accounting firm, from 2000 until he joined ION. Mr. Schwausch is a Certified Public Accountant and a Certified Management Accountant. He received a Bachelor of Science degree in accounting from Brigham Young University.

EXECUTIVE COMPENSATION

Introductory note: The following discussion of executive compensation contains descriptions of various employee benefit plans and employment-related agreements. These descriptions are qualified in their entirety by reference to the full text or detailed descriptions of the plans and agreements, which are filed or incorporated by reference as exhibits to our annual report on Form 10-K for the year ended December 31, 2019. In this discussion, the terms ''ION,'' ''we,'' ''our'' and ''us'' refer to ION Geophysical Corporation and its consolidated subsidiaries, except where the context otherwise requires or as otherwise indicated.

COMPENSATION DISCUSSION AND ANALYSIS

This Compensation Discussion and Analysis (this "CD&A") provides an overview of the Compensation Committee of the Company's Board of Directors, a discussion of the background and objectives of our compensation programs for our senior executives, and a discussion of all material elements of the compensation of each of the executive officers identified in the following table, whom we refer to as our named executive officers ("NEOs"):

Christopher T. Usher	President, Chief Executive Officer and Director (starting June 1, 2019) Executive Vice President and Chief Operating Officer, Operations Optimization (through May 31, 2019)
R. Brian Hanson	President, Chief Executive Officer and Director (through June 1, 2019)
Steven A. Bate	Chief Financial Officer(1)
Kenneth G. Williamson	Executive Vice President and Chief Operating Officer, E&P Technology & Services
Matthew Powers	Executive Vice President, General Counsel and Corporate Secretary
Scott P. Schwausch	Vice President, Corporate Controller, and Chief Accounting Officer

Executive Summary

General. Annual compensation of our NEOs comprises three principal elements: base salary; performance-based annual non-equity incentive plan compensation (that is, annual cash bonuses); and long-term equity-based incentive awards (restricted stock, stock options, and cash-settled stock appreciation rights awards ("SARs")). A significant portion of each NEOs' total annual compensation is performance-based, at risk, and dependent upon our Company's achievement of specific, measurable performance goals. Our performance-based pay closely aligns our NEOs' interests with those of our shareholders and promotes the creation of shareholder value, without encouraging excessive risk-taking. In addition, our equity programs, combined with our executive share ownership requirements, are designed to reward long-term stock performance and encourage investment in the Company.

Annual Bonus Incentive Plan. No continuing NEO received a bonus payment under our annual cash bonus incentive plan for 2019. Our former CEO, Mr. Hanson (who retired from the Company effective June 1, 2019), and our former CFO, Mr. Bate (who stepped down from his role as Chief Financial Officer effective February 1, 2020) received 100% of their contractual bonus targets for 2019, but these payments were made in connection with negotiated terminations of their employment contracts with the Company. Mr. Hanson received an amount equal to 100% of his annual base salary, prorated to reflect his June 1 departure, and Mr. Bate received an amount equal to 75% of his annual base salary.

The other NEOs (Messrs. Usher, Williamson, Powers and Schwausch) did not receive cash bonuses for 2019. At the February board meeting, Mr. Usher expressed his strong belief that the bonus plan pool should not be fully funded because, while the Company performed well on several strategic initiatives, the Company fell short of its cash-generation objectives, which are of paramount importance. He also felt that a "leaders eat last" approach to 2019 bonus compensation would help sustain morale and prevent attrition of valuable employees. He recommended an attenuated bonus pool for the Company's employees, and no bonuses for the NEOs, including himself, for 2019. The Compensation Committee concurred in this judgment.

(1) Effective February 1, 2020, Mr. Bate stepped down as CFO. Mr. Bate will continue to serve as a strategic advisor through June, 2020, to facilitate a seamless transition. Mr. Michael Morrison, who has held a number of positions with the Company (most recently Treasurer and VP, Finance) currently serves as the interim CFO.

Subsequent developments in March 2020- namely, the COVID-19 pandemic and the shock to oil prices—prompted Mr. Usher and the Compensation Committee to revise their decision to fund the pool in even a reduced amount, and instead to not fund the 2019 bonus pool.

Base Salaries. Mr. Usher received an increase in base pay in connection with his promotion to President and Chief Executive Officer; his annual salary increased from $378,560 to $525,000. No other NEO received an increase in base pay in 2019.

Long-Term Stock-Based Incentive Compensation. Mr. Usher received a grant of equity-based compensation in 2019, in connection with his promotion to President and CEO, which is further set forth below. No other NEO received any grant of equity-based compensation.

Corporate Governance

Compensation Committee

The Compensation Committee of our Board reviews and approves, or recommends to the Board for approval, all salary and other remuneration for our NEOs, and oversees matters relating to our employee compensation and benefit programs. No member of the Compensation Committee is an employee of ION. The Board has determined that each member of the Compensation Committee satisfies the definition of "independent" as established in the NYSE corporate governance listing standards. In determining the independence of each member of the Compensation Committee, the Board considered all factors specifically relevant to determining whether the director has a relationship to our Company that is material to the director's ability to be independent from management in the execution of his duties as a Compensation Committee member, including, but not limited to:

- the source of compensation of the director (including any consulting, advisory or other compensatory fee paid by us to the director); and
- whether the director is affiliated with our Company, a subsidiary or affiliate.

When considering the director's affiliation with us for purposes of independence, the Board considered whether the affiliate relationship places the director under the direct or indirect control of our Company or its senior management, or creates a direct relationship between the director and members of senior management, in each case, of a nature that would impair the director's ability to make independent judgments about our executive compensation.

The Compensation Committee operates pursuant to a written charter that sets forth its functions and responsibilities. A copy of the charter can be viewed on our website at *http://ir.iongeo.com/phoenix.zhtml?c=101545&p=irol-govhighlights*. For a description of the responsibilities of the Compensation Committee, see *"Item 1.—Election of Directors—Committees of the Board—Compensation Committee"* above.

During 2019, the Compensation Committee met eight times and took action by unanimous written consent three times.

Compensation Consultants

The Compensation Committee has the authority and necessary funding to engage and pay compensation consultants, independent legal counsel and other advisors in its discretion. Prior to retaining any such compensation consultant or other advisor, the Compensation Committee evaluates the independence of such advisor and evaluates whether such advisor has a conflict of interest.

Role of Management in Establishing and Awarding Compensation

On an annual basis, our Chief Executive Officer, with input from our Human Resources department, recommends to the Compensation Committee any proposed increases in base salary, bonus payments and equity awards for our NEOs (other than himself; no NEO is involved in determining his own salary increase, bonus payment or equity award). When making officer compensation recommendations, our Chief Executive Officer takes into consideration compensation benchmarks, which include data relating to the compensation of employees at comparable companies, the level of inherent importance and risk associated with the position and function, and the executive's job performance over the previous year. See "*—Objectives of Our Executive Compensation Programs—Benchmarking*" and *"—Elements of Compensation—Base Salary"* below.

Our Chief Executive Officer, with assistance and input from senior management, also formulates and proposes to the Compensation Committee an employee bonus incentive plan for the ensuing year. For a description of our process for formulating the employee bonus incentive plan and the factors that we consider, see "*—Elements of Compensation—Bonus Incentive Plan*" below.

The Compensation Committee reviews and approves all compensation and awards to NEOs and all bonus incentive plans. With respect to equity compensation awarded to employees other than NEOs, the Compensation Committee reviews and approves all grants of restricted stock and stock options above 5,000 shares, generally based upon the recommendation of the Chief Executive Officer, and has delegated option and restricted stock granting authority to the Chief Executive Officer as permitted under Delaware law for grants to non-NEOs of up to 5,000 shares.

Of its own initiative, at least once a year, the Compensation Committee reviews the performance and compensation of our Chief Executive Officer and, following discussions with the Chief Executive Officer and other members of the Board, establishes his compensation level. Where it deems appropriate, the Compensation Committee will also consider market compensation information from independent sources. See "*—Objectives of Our Executive Compensation Programs—Benchmarking*" below.

Certain members of our senior management attend most meetings of the Compensation Committee, including our Chief Executive Officer and our Executive Vice President, General Counsel & Corporate Secretary. However, no member of management votes on items being considered by the Compensation Committee, and members of management are recused from meetings and portions of meetings where their personal compensation is discussed. The Compensation Committee and Board do solicit the views of our Chief Executive Officer on compensation matters, particularly as they relate to the compensation of the other NEOs and the other members of senior management reporting to the Chief Executive Officer. The Compensation Committee often conducts an executive session during meetings, during which members of management are not present.

Objectives of Our Executive Compensation Programs

General Compensation Philosophy and Policy

Through our compensation programs, we seek to:

- attract and retain qualified and productive executive officers and key employees by providing total compensation competitive with that of other executives and key employees employed by companies of similar size, complexity and industrial sector;
- encourage our executives and key employees to drive the Company's financial and operational performance;
- structure compensation to create meaningful links between corporate performance, individual performance and financial rewards;

- align the interests of our executives with those of our shareholders by providing a significant portion of total pay in the form of equity-based incentives;
- encourage long-term commitment to our Company; and
- limit corporate perquisites to seek to avoid perceptions both within and outside of our Company of "soft" compensation.

Our governing principles in establishing executive compensation have been:

Long-Term and At-Risk Focus. Compensation opportunities should be composed of long-term, at-risk pay to focus our management on the long-term interests of our Company.

Equity Orientation. Equity-based plans should comprise a major part of the at-risk portion of total compensation to instill ownership thinking and to link compensation to corporate performance and shareholder interests.

Competitive. We emphasize total compensation opportunities consistent on average with our peer group of companies. Competitiveness of annual base pay and annual bonuses is more independent of stock performance than equity-based compensation. However, overall competitiveness of total compensation is generally contingent on long-term, equity-based compensation programs. Base salary, annual bonuses and employee benefits should be close to competitive levels when compared to similarly situated companies.

Focus on Total Compensation. In making decisions with respect to any element of an NEO's compensation, the Compensation Committee considers the total compensation that may be awarded to the NEO, including salary, annual cash bonus and long-term equity-based incentive compensation. The Compensation Committee analyzes all of these elements of compensation (including the compensation mix) as well as the aggregate total amount of actual and projected compensation. In its most recent review of total compensation, the Compensation Committee determined that annual compensation amounts for our Chief Executive Officer and our other NEOs remained generally consistent with the Compensation Committee's expectations. However, the Compensation Committee reserves the right to make changes that it believes are warranted.

Internal Pay Equity. Our core compensation philosophy is to pay our NEOs competitive levels of compensation that best reflect their individual responsibilities and contributions to our Company, while providing incentives to achieve our business and financial objectives. While comparisons to compensation levels at other companies are helpful in assessing the overall competitiveness of our compensation program, we believe that our executive compensation program also must be internally consistent and equitable in order for our Company to achieve our corporate objectives. Over time, there have been variations in the comparative levels of compensation of NEOs and changes in the overall composition of the management team and the overall accountabilities of the individual NEOs; however, we are satisfied that total compensation received by NEOs reflects an appropriate differential for executive compensation.

These principles apply to compensation policies for all of our NEOs and key employees. We do not follow the principles in a mechanistic fashion; rather, we apply experience and judgment in determining the appropriate mix of compensation for each individual. This judgment also involves periodic review of discernible measures to determine the progress each individual is making toward agreed-upon goals and objectives.

Benchmarking

When making compensation decisions, we also look at the compensation of our Chief Executive Officer and other NEOs relative to the compensation paid to similarly situated executives at companies that we consider to be our industry and market peers—a practice often referred to as "benchmarking." We believe, however, that a benchmark should be just that—a point of reference for measurement—but not the determinative factor for our executives' compensation. The purpose of the comparison is not to supplant the analyses of internal pay equity, shareholder interests and the individual performance of the NEOs that we consider when making compensation decisions. Because the comparative compensation information is just one of the several analytic tools that are used in setting executive compensation, the Compensation Committee has discretion in determining the nature and extent of its use. Further, given the limitations associated with comparative pay information for setting individual executive compensation, including the difficulty of assessing and comparing wealth accumulation through equity gains, the Compensation Committee may elect not to use the comparative compensation information at all in the course of making compensation decisions.

Most years the Compensation Committee, with assistance from the Human Resources Department, reviews data from market surveys and other sources to assess our competitive position with respect to employee compensation. The Chief Executive Officer normally apprises the Compensation Committee of any proposed increase in any NEO's annual base salary in the autumn board meeting and, at that same meeting, the Compensation Committee considers whether to adjust the Chief Executive Officer's annual base salary. In 2019, the Compensation Committee elected to defer consideration of any base salary adjustments until 2020 (with the exception of Mr. Usher, whose compensation was adjusted in connection with his promotion to President and Chief Executive Officer).

Consideration of equity grants are normally undertaken at least annually, often in the February meeting. Mr. Usher was the only NEO to receive equity awards in 2019, which were made in connection with his promotion.

In 2019, the Committee utilized data primarily from Willis Towers Watson The Committee also engaged the services of Aon Hewitt, a leading compensation consultant, to analyze Mr. Usher's compensation in connection with his promotion.

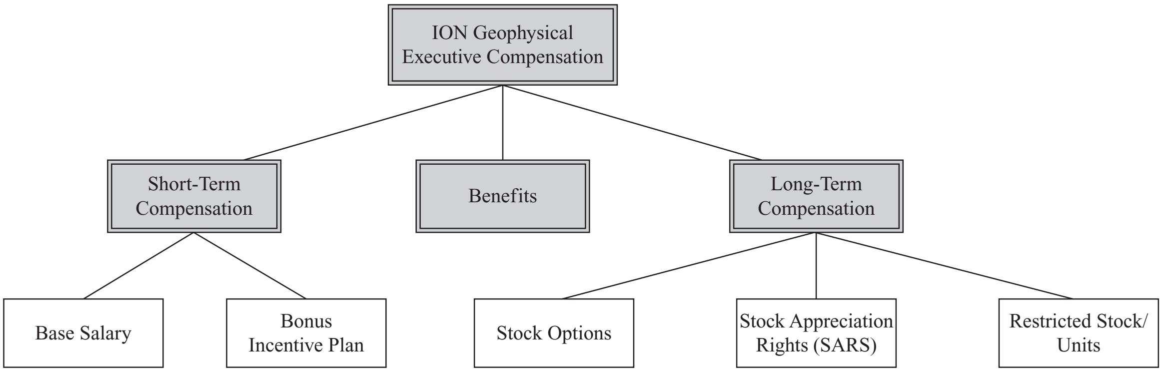
Reviewing compensation data provides a starting point for our compensation analysis. We believe that the data contain relevant compensation information from companies that are representative of the sectors in which we operate, have relative size as measured by market capitalization and experience relative complexity in the business and the executives' roles and responsibilities. We look extensively at a number of other factors beyond the data, including our estimates of the compensation at our most comparable competitors and other companies that were closest to our Company in size, profitability and complexity. We also consider an individual's current performance, the level of responsibility, risk of attrition, market conditions, and the employee's skills and experience, collectively, in making compensation decisions.

In the case of our Chief Executive Officer and some of our other NEOs, we also consider our Company's performance during the person's tenure and the anticipated level of compensation that would be required to replace the person with someone of comparable experience and skill.

In addition to our periodic review of compensation, we also regularly monitor market conditions and will adjust compensation levels from time to time as necessary to remain competitive and retain our most valuable employees.

Elements of Compensation

The primary components of our executive compensation program are as follows:



Below is a summary of each component:

Base Salary

General. The general purpose of base salary for our NEOs is to create a base of cash compensation that is consistent on average with the range of base salaries for executives in similar positions and with similar responsibilities at comparable companies. In addition to salary norms for persons in comparable positions at comparable companies, base salary amounts may also reflect the nature and scope of responsibility of the position, the expertise and experience of the individual employee and the competitiveness of the market for the employee's services. Base salaries of executives other than our Chief Executive Officer may also reflect our Chief Executive Officer's evaluation of the individual NEO's job performance. As a result, the base salary level for each individual may be above or below the target market value for the position. The Compensation Committee also recognizes that the Chief Executive Officer's compensation should reflect the greater policy-and decision-making authority that he holds and the higher level of responsibility he has with respect to our strategic direction and our financial and operating results. As of December 31, 2019, our Chief Executive Officer's annual base salary was 36% higher than the annual base salary for the next highest-paid NEO and 70% higher than the average annual base salary for all of our other NEOs. The Compensation Committee does not intend for base salaries to be the vehicle for long-term capital and value accumulation for our executives.

2019 Actions. In typical years, base salaries are reviewed at least annually and may also be adjusted from time to time to realign salaries with market levels after taking into account individual responsibilities and changes in responsibilities, performance and contribution to ION, experience, impact on total compensation, relationship of compensation to other ION officers and employees, and changes in external market levels. No NEO received an increase in base salary in 2019, other than Mr. Usher, in connection with his promotion. The chart below depicts the base salaries of our NEOs, together with information on their base salaries vis-à-vis the median salaries of comparable NEOs based on survey data.

Special Note on 2020 Actions

In April of 2020, in view of the extreme market downturn due to the COVID-19 pandemic, all NEOs received a 20% reduction in base pay (except for Mr. Schwausch, who received a 15% reduction in his base pay).

Named Executive Officer	Salary Information
Christopher T. Usher	Mr. Usher's salary, commencing on his promotion to President and CEO on June 1, 2019, was $525,000. The 2019 MTCS Survey indicated that the mean CEO base salary for surveyed companies in the Services and Drilling sector was $700,000. Prior to his promotion, Mr. Usher served as COO over the Company's Operations Optimization segment. His salary in 2019 when he served in this capacity was $378,560. The 2019 MTCS Survey indicated that the mean Chief Operating Officer—Subsidiary/Group/Division base salary for surveyed companies in the Services and Drilling sector was $376,500.
R. Brian Hanson	Mr. Hanson's salary in 2019 when he served as CEO was $600,000. The 2019 MTCS Survey indicated that the mean CEO base salary for surveyed companies in the Services and Drilling sector was $700,000.
Steven A. Bate	Mr. Bate's salary throughout 2019 was $375,000. The 2019 MTCS Survey indicated that the mean CFO base salary for surveyed companies in the Services and Drilling sector was $410,000.
Kenneth G. Williamson	Mr. Williamson's salary throughout 2019 was $387,213. The 2019 MTCS Survey indicated that the mean Chief Operating Officer—Subsidiary/Group/Division base salary for surveyed companies in the Services and Drilling sectors was $376,500.
Matthew R. Powers	Mr. Powers' salary throughout 2019 was $275,000. The 2019 MTCS Survey indicated that the mean Top Legal Executive base salary for surveyed companies in the Services and Drilling sector was $350,000.
Scott P. Schwausch	Mr. Schwausch's salary throughout 2019 was $200,450. The 2019 MTCS Survey indicated that the mean base salary for surveyed companies in the Services and Drilling sector was $250,000.

Annual Bonus Incentive Plan(1)

For several consecutive years, the Compensation Committee has approved an annual employee bonus incentive plan. Our annual bonus incentive plan is intended to promote the achievement, each year, of the Company's performance objectives as set forth in the annual operating plan. These objectives are defined early in the year, along with a target bonus pool, and these are communicated to eligible employees. The Compensation Committee believes that placing a portion of our employees'

(1) The Compensation Committee has discretion in circumstances it determines are appropriate to authorize discretionary bonus awards apart from awards that would otherwise be payable under the terms of the annual bonus incentive plan. (An example would be signing bonuses for new hires.)

cash compensation at-risk, and tying it to the Company's achieving important objectives under our operating plan, incentivizes our employees in a way that aligns their interests with the interests of our shareholders.

Early in the year, management prepares an operating budget for that year and individual operating budgets for each operating unit. The budgets take into consideration our views on market opportunities, customer and sale opportunities, technology enhancements for new products, product manufacturing and delivery schedules and other operating factors known or foreseeable at the time. The Board analyzes the proposed budgets with management extensively and, after analysis and consideration, the Board approves a consolidated operating plan for the year. During this same time, our Chief Executive Officer works with various members of senior management to formulate our bonus incentive plan for the year, consistent with the operating plan approved by the Board. The annual bonus incentive plan is subject to approval by the Compensation Committee. Historically, bonuses attributable to a given year have been paid in February of the next year. Mr. Bate received his contractually mandated target bonus in March of 2020, and Mr. Hanson received his in August of 2019, each in accordance with his respective severance agreement. No other NEO's received bonuses for 2019.

The Company's bonus program thus includes a three-step process:

1. At the first quarterly meeting of the Board of Directors in early February, the Compensation Committee approves a target total bonus pool (the "Target Pool") for that calendar year. The Target Pool is based in part on approximate percentages of base salary and our expected headcount. The Target Pool consists of two variable components: the Company's execution of defined long-term strategic initiatives ("Key Initiatives"), and the Company's reaching a defined cash-generation target ("Cash Generation Target"). The Key Initiatives and Cash Generation Target are derived from our annual operating plan, which is approved by the Board at that same quarterly meeting. The Target Pool, Key Initiatives, and Cash Generation Target are forward looking; that is, they are based on the Compensation Committee's goals and expectations for the Company's performance that year.
2. The determination of the actual amount of the bonus pool (the "Actual Pool") is largely backward looking. At the February meeting of the Board of Directors, in addition to approving the Target Pool for that calendar year, the Compensation Committee determines what the Actual Pool for the prior year should be. The Compensation Committee does this with reference to the Target Pool for the prior year, and the Company's success in achieving the Key Initiatives and the Cash Generation Target for the prior year. However, the Compensation Committee has the authority to fund the Actual Pool in an amount over the Target Pool, an amount under the Target Pool, or not at all. In determining whether to deviate from the Target Pool, the Compensation Committee may consider events that unfolded during the prior year that impacted our performance as a whole that year (such as extraordinary cash generating events (e.g. sales of assets, equity raises), unanticipated governmental actions or economic conditions, indicators of growth or recession in our business segments, and other factors).
3. Once the Actual Pool is funded, individual bonuses are determined by business unit managers by evaluating each eligible employee's individual and team performance during the prior year (except that no manager participates in determining his or her own bonus). The computation of individual awards for NEOs is approved by the Compensation Committee in accordance with the compensation philosophy and policy described above.

Our bonus incentive plans are designed for payouts that generally track the financial performance of our Company and, to a lesser extent, achievement of the Company's strategic objectives. The general intent of the plans is to reward key employees based on the Company's and the employee's performance, in each case measured against internal targets and plans. In most years when our Company's financial performance is strong, cash bonus payments under the annual incentive plan are generally higher. Likewise, when our financial performance is low as compared to our internal targets and plans, cash bonus payments are generally lower. There are occasionally exceptions to this general trend.

The Actual Pool for 2019 bonuses would have been $7.4 million if the Compensation Committee elected to fund it based on the Target Pool in the 2019 bonus plan. As further set forth below, this year the Compensation Committee elected not to fund the 2020 bonus pool.

2019 Bonus Incentive Plan. The purpose of the 2019 bonus incentive plan was to provide an incentive for our participating employees to achieve their highest level of individual and business unit performance, to align the employees to accomplish and share in the achievement of our Company's 2019 strategic and financial goals, and to prevent attrition of our high-performing employees to competitors. Designated employees, including our NEOs, were eligible to participate in our 2019 bonus incentive plan.

The Target Pool under the 2019 plan was set at $9.3 million in February 2019. Approximately 35% of this amount ($3.3 million) was tied to the Key Initiatives for 2019, and 65% ($6 million) was tied to the Cash Generation Target for 2019.

In February 2020, the Compensation Committee reviewed the Company's actual performance against each of the plan performance goals established at the beginning of 2019.

While the Company did not meet its Cash Generation Target, it did achieve cash generation that would have funded a portion of the 65% of the pool determined by that metric. The Compensation Committee found that the Company's achievement of the Key Initiatives was approximately 80%. Based on a strict application of the 2019 bonus incentive plan metrics, the Actual Pool would have been funded at $7.5 million.

However, at the February board meeting, the Compensation Committee and Mr. Usher believed that the Company's failure to generate free cash flow made it appropriate to attenuate the Actual Pool. Mr. Usher suggested, and the Compensation Committee agreed, that the recent reduction in force and the greater accountability of the NEOs for the Company's overall performance in 2019 made it appropriate to not grant any discretionary annual bonuses to NEOs. This would also allow a smaller, $2 million bonus pool to go further in rewarding non-executives in the Company, which would benefit morale and help prevent attrition, which, in turn, would drive shareholder value in 2020.

However, in light of the market conditions caused by the COVID-19 pandemic and decline in oil prices in March 2020, the Compensation Committee and Mr. Usher determined that it was not appropriate to award any cash bonuses for 2019.

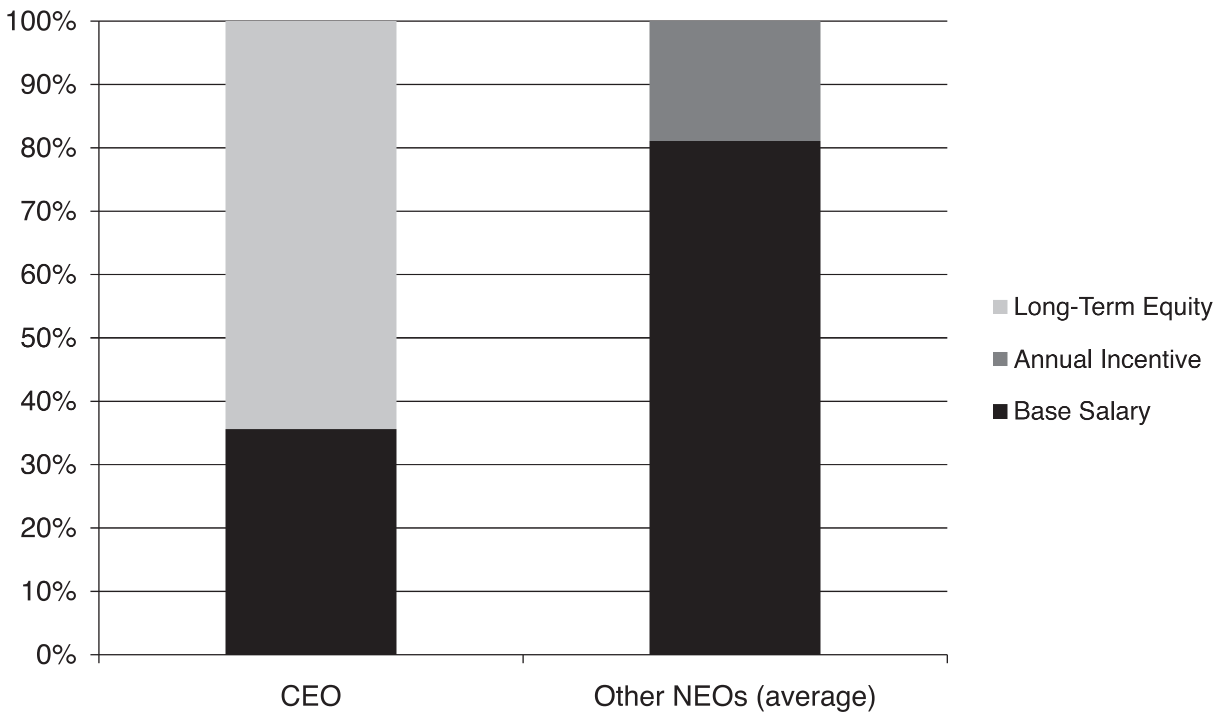
The total compensation paid to each NEO is set forth in the graph titled "*Summary Compensation Table*".

The Compensation Committee reviews the annual bonus incentive plan each year to ensure that the key elements of the plan continue to meet the objectives described above.

Long-Term Stock-Based Incentive Compensation

We structure our long-term incentive compensation to appropriately balance between rewarding performance and encouraging employee retention and stock ownership. There is no pre-established policy or target for the allocation between either cash or non-cash, or short-term and long-term, incentive compensation; however, at executive management levels, the Compensation Committee strives for compensation to focus more on longer-term incentives. In conjunction with the Board, executive management is responsible for setting and achieving long-term strategic goals. In support of this responsibility, compensation for executive management, and most particularly our Chief Executive Officer, tends to be weighted towards rewarding long-term value creation for shareholders.

The below table illustrates the mix of total compensation received by Mr. Usher, our CEO, and our other current NEOs during 2019:



Our long-term incentive plans have provided the principal method for our NEOs to acquire equity or equity-linked interests in our Company.

Restricted Stock and Restricted Stock Units. We use restricted stock and restricted stock units to focus executives on our long-term performance and to help align their compensation more directly with shareholder value. Until 2018, vesting of restricted stock and restricted stock units typically occurred ratably over three years, based solely on continued employment of the recipient-employee, and the terms of our LTIP (both prior to and after amendments to it in 2018) require restricted stock and restricted stock units granted under that plan to follow that vesting schedule unless the Compensation Committee approves a different schedule when approving the grant.

Starting in 2018, the Compensation Committee began to require that most grants of restricted stock contain not only our traditional time-based vesting restrictions, but also contain very aggressive performance-based vesting restrictions: one-third of any such award will vest only if ION's common stock attains, and maintains, a share price of $17.50 on or before the third anniversary of the grant date; two-thirds of any such award will vest only if ION's common stock attains, and maintains, a share price of $22.50 on or before the third anniversary of the grant date; and full vesting as to any such award will occur only if ION's common stock attains, and maintains, a share price of $27.50 on or before the third anniversary of the grant date. This performance-based vesting restriction can be satisfied only if the volume weighted average price per share, at the close of 20 consecutive trading days, meets or exceeds the target price, and are in addition to the time-based vesting restrictions. In addition to facilitating an ownership mentality among our employees, this recent approach to restricted shares allows a more economical use of the shares in our LTIP, as, if the vesting restrictions are satisfied, each share of restricted stock is intrinsically more valuable to an employee than each single stock option, because, in the case of a stock option, even if the stock appreciates, such that the option is not worthless, the employee only receives the benefit of the spread between the exercise price of the option and the value of the stock.

For the 2019 grants to Mr. Usher, made in connection with his promotion to President and Chief Executive Officer, the Compensation Committee had to balance their preference for performance-based vesting restrictions with establishing a total compensation in line with the responsibilities of the chief executive position. Taking into account the recommendations of compensation consulting firm AON Hewitt, the Committee determined that a 50/50 ratio of time-restricted-only to fully-at-risk shares was the most appropriate, given prevailing market compensation, industry competition for executive talent, the Company's stock price and performance hurdles used, and the available pool of equity in the Plan.

Changes to Restricted Stock Granting Agreement. In connection with the awards to Mr. Usher, the Compensation Committee also approved new forms for award agreements that grant restricted stock, to ensure, among other things, that any early vesting due to a change in control of the Company shall be subject to the grantee's actual or constructive termination by the Company's successor (that is, the vesting is "double trigger"), and that any early vesting in the event of the grantee's death or disability will only serve to remove the time (service) restriction of the grant, but not the vesting restriction based on the Company's stock price.

Stock Options. Under our equity plans, stock options may be granted having exercise prices equal to the closing price of our stock on the date before the date of grant. In any event, all awards of stock options are made at or above the market price at the time of the award. The Compensation Committee will not grant stock options having exercise prices below the market price of our stock on the date of grant, and will not reduce the exercise price of stock options (except in connection with adjustments to reflect recapitalizations, stock or extraordinary dividends, stock splits, mergers, spin-offs and similar events, as required by the relevant plan) without the consent of our shareholders. Our stock options generally vest ratably over four years, based on continued employment, and the terms of our plan require stock options granted under that plan to follow that vesting schedule unless the Compensation Committee approves a different schedule when approving the grant. Prior to the exercise of an option, the holder has no rights as a shareholder with respect to the shares subject to such option, including voting rights and the right to receive dividends or dividend equivalents. New option grants normally have a term of ten years.

The purpose of stock options is to provide equity compensation with value that has been traditionally treated as entirely at-risk, based on the increase in our stock price and the creation of shareholder value. (However, beginning in 2018, the Compensation Committee has favored placing restricted stock grants entirely at risk by means of performance-based vesting restrictions.) Stock options also allow our NEOs and key employees to have equity ownership and to share in the appreciation of the value of our stock, thereby aligning their compensation directly with increases in shareholder value. Stock options only have value to their holder if the stock price appreciates in value from the date options are granted.

Stock option award decisions are generally based on past business and individual performance. In determining the number of options to be awarded, we also consider the grant recipient's qualitative and quantitative performance, the size of stock option and other stock based awards in the past, and expectations of the grant recipient's future performance. No NEOs received option awards in 2019.

Stock Appreciation Rights. SARs grants approved by the Compensation Committee are typically 100% cash-settled. The vesting of the SARs are achieved through both a market condition and a service condition (that is, continued employment plus appreciation in the Company's stock price). As with our stock options, exercise prices for our SARs awards are equal to the closing price of our stock on the date before the date of grant. New SARs grants normally have a term of ten years. No NEOs received SARs grants in 2019.

Approval and Granting Process. The Compensation Committee reviews and approves all stock appreciation rights, stock option, restricted stock and restricted stock unit awards made to NEOs, regardless of amount. With respect to equity compensation awarded to employees other than NEOs, the Compensation Committee reviews and approves all grants of stock appreciation rights, restricted stock, stock options and restricted stock units above 5,000 shares, generally based upon the recommendation of our Chief Executive Officer. The Compensation Committee has granted to our Chief Executive Officer the authority to approve grants to any employee other than an NEO of (i) up to 5,000 shares of restricted stock and (ii) stock options for not more than 5,000 shares. Our Chief Executive Officer is also required to provide a report to the Compensation Committee of all awards of options and restricted stock made by him under this authority. We believe that this policy is beneficial because it enables smaller grants to be made more efficiently. This flexibility is particularly important with respect to attracting and hiring new employees, given the increasingly competitive market for talented and experienced technical and other personnel in locales in which our employees work.

The Board prefers, and the Company strives, for all grants of stock appreciation rights, restricted stock, restricted stock units and stock options to be made on one of four designated quarterly grant dates: March 1, June 1, September 1 or December 1. We favor these dates because they are not close to any dates on which we normally make earnings announcements or other announcements of material events. For an award to a current employee, the grant date for the award is generally the first designated quarterly grant date that occurs after approval of the award. For an award to a newly hired employee who is not yet employed by us at the time the award is approved, the grant date for the award is generally the first designated quarterly grant date that occurs after the new employee commences work. We believe that this process of fixed quarterly grant dates is beneficial because it serves to remove any perception that the grant date for an award could be capable of manipulation or change for the benefit of the recipient. In addition, having all grants occur on a maximum of four days during the year simplifies certain fair value accounting calculations related to the grants, thereby reducing the administrative burden associated with tracking and calculating the fair values, vesting schedules and tax-related events upon vesting of restricted stock and also lessening the opportunity for inadvertent calculation errors.

Clawback Policy

We have a Compensation Recoupment Policy (commonly referred to as a "clawback" policy), which provides that, in the event of a restatement of our financial results due to material noncompliance with applicable financial reporting requirements, the Board will, if it determines appropriate and subject to applicable laws and the terms and conditions of our applicable stock plans, programs or arrangements, seek reimbursement of the incremental portion of performance-based compensation, including performance-based bonuses and long-term equity-based incentive awards, paid to current or former NEOs within three years of the restatement date, in excess of the compensation that would have been paid had the compensation amount been based on the restated financial results.

Personal Benefits, Perquisites and Employee Benefits

Our Board and executives have concluded that we will not offer most perquisites traditionally offered to executives of similarly sized companies. As a result, perquisites and any other similar personal benefits offered to our NEOs are substantially the same as those offered to our general salaried employee population. These offered benefits include medical and dental insurance, life insurance, disability insurance, a vision plan, charitable gift matching (up to designated limits), a 401(k) plan with a company match of certain levels of contributions, flexible spending accounts for healthcare and dependent care and other customary employee benefits. Business-related relocation benefits may be reimbursed on a case-by-case basis. We intend to continue applying our general policy of not providing specific personal benefits and perquisites to our executives; however, we may, in our discretion, revise or add to any executive's personal benefits and perquisites if we deem it advisable.

Risk Management Considerations

The Compensation Committee believes that our Company's bonus and equity programs create incentives for employees to create long-term shareholder value. The Compensation Committee has considered the concept of risk as it relates to our compensation programs and has concluded that our compensation programs do not encourage excessive or inappropriate risk-taking. Several elements of the compensation programs are designed to promote the creation of long-term value and thereby discourage behavior that leads to excessive risk:

- The compensation programs consist of both fixed and variable compensation. The fixed (or salary) portion is designed to provide a steady income regardless of the Company's stock price performance so that executives do not focus exclusively on stock price performance to the detriment of other important business metrics. The variable (cash bonus and equity) portions of compensation are designed to reward both short- and long-term corporate performance. The Compensation Committee believes that the variable elements of compensation are a sufficient percentage of overall compensation to motivate executives to produce positive short- and long-term corporate results, while the fixed element is also sufficiently high such that the executives are not encouraged to take unnecessary or excessive risks in doing so.
- The financial metrics used to determine the amount of an executive's bonus are measures the Compensation Committee believes contribute to long-term shareholder value and ensure the continued viability of the Company. Moreover, the Compensation Committee attempts to set ranges for these measures that encourage success without encouraging excessive risk taking to achieve short-term results. In addition, the overall maximum bonus for each participating NEO other than our Chief Executive Officer is not expected to exceed 150% of the executive's base salary under the bonus plan, and the overall bonus for our Chief Executive Officer under his employment agreement is not expected to exceed 200% of his base salary under the bonus plan, in each case no matter how much the Company's financial performance exceeds the ranges established at the beginning of the year.
- We have strict internal controls over the measurement and calculation of the financial metrics that determine the amount of an executive's bonus, designed to keep it from being susceptible to manipulation by an employee, including our executives.
- Stock options become exercisable over a four-year period, and SARs become exercisable over a three-year period, generally conditioned on continuing employment with the Company, and remain exercisable for up to ten years from the date of grant, encouraging executives to look to long-term appreciation in equity values.
- Restricted stock and SARs vest over a three-year period, generally conditioned on continuing employment with the Company, which, again, encourages executives to look to long-term appreciation in equity values. Additionally, as noted above, beginning in 2018, the majority of stock grants and SARs grants also require significant appreciation in our stock price for vesting to occur.

- Senior executives, including our NEOs, are required to acquire over time and hold shares of our Company's stock having a value of between one and four times the executive's annual base salary, depending on the level of the executive. The Compensation Committee believes that the stock ownership guidelines provide a considerable incentive for management to consider the Company's long-term interests, since a portion of their personal investment portfolio consists of our Common Stock.
- In addition, we do not permit any of our NEOs or directors to enter into any derivative or hedging transactions involving our stock, including short sales, market options, equity swaps and similar instruments, thereby preventing executives from insulating themselves from the effects of poor company stock price performance. Please refer to "*—Stock Ownership Requirements; Hedging Policy*" below.
- We have a compensation recoupment (clawback) policy that provides, in the event of a restatement of our financial results due to material noncompliance with financial reporting requirements, for reimbursement of the incremental portion of performance-based compensation, including performance-based cash bonuses and long-term equity-based incentive awards, paid to current or former NEOs within three years of the restatement date, in excess of the compensation that would have been paid had such compensation amount been based on the restated financial results. Please refer to "*—Clawback Policy*" above.

Consideration of Say-On-Pay Result. At our 2019 Annual Meeting of Shareholders held on May 15, 2019, our shareholders approved all of our director nominees and proposals, including a non-binding advisory vote to approve the compensation of our NEOs ("say-on-pay"). In the advisory executive compensation vote, over 96% of the votes cast on the proposal voted in favor of our executive compensation. Our general goal is to continue to act consistently with the established practices that were approved by our shareholders. We believe that we have accomplished that goal. At our 2017 Annual Meeting, our shareholders also voted on a non-binding advisory vote on the frequency of advisory votes on executive compensation ("say-on-frequency") and approved "every year". The Board intends to hold advisory votes on executive compensation within the time frame approved by the shareholders. When and if our Board determines that it is in the best interest of our Company to hold our say-on-pay vote with a different frequency, we will propose such a change to our shareholders at the next annual meeting of shareholders to be held following the Board's determination. Presently, under SEC rules, we are not required to hold another say-on-frequency vote again until our 2023 Annual Meeting of Shareholders.

Indemnification of Directors and Executive Officers

Our Bylaws provide certain rights of indemnification to our directors and employees (including our NEOs) in connection with any legal action brought against them by reason of the fact that they are or were a director, officer, employee or agent of our Company, to the full extent permitted by law. Our Bylaws also provide, however, that no such obligation to indemnify exists as to proceedings initiated by an employee or director against us or our directors unless (a) it is a proceeding (or part thereof) initiated to enforce a right to indemnification or (b) was authorized or consented to by our Board.

As discussed below, we have also entered into employment agreements with certain of our NEOs that provide for us to indemnify the executive to the fullest extent permitted by our Restated Certificate of Incorporation, as amended, and our Bylaws. The agreements also provide that we will provide the executive with coverage under our directors' and officers' liability insurance policies to the same extent as provided to our other executives.

Stock Ownership Requirements; Hedging Policy

We believe that broad-based stock ownership by our employees (including our NEOs) enhances our ability to deliver superior shareholder returns by increasing the alignment between the interests of our employees and our shareholders. Accordingly, the Board has adopted stock ownership guidelines applicable to each of our senior executives, including our NEOs. The policy requires each executive to retain direct ownership of at least 50% of all shares of our Company's stock received upon exercise of stock options and vesting of awards of restricted stock or restricted stock units until the executive owns shares having an aggregate value (setting aside risk of forfeiture) equal to the following multiples of the executive's annual base salary:

President and Chief Executive Officer—4x

Executive Vice President—2x

Senior Vice President—1x

The Compensation Committee and our Chief Executive Officer may, in their discretion, grant temporary exemptions from the guidelines to prevent severe hardships to senior executives. As of the date of this Proxy Statement, all of our NEOs were in compliance with the stock ownership requirements. In addition, we do not permit any of our NEOs or directors to enter into any derivative or hedging transactions with respect to our stock, including short sales, market options, equity swaps and similar instruments.

Impact of Regulatory Requirements and Accounting Principles on Compensation

Code Section 162(m) limits the Company's ability to deduct compensation paid in any given year to our "covered employees" (as defined by Section 162(m), generally, our current and former named executive officers) in excess of $1.0 million. Prior to the enactment of legislation commonly referred to as the Tax Cuts and Jobs Act (the "TCJA"), Section 162(m) provided an exception from this deduction limit for certain forms of "performance-based compensation," which included the gain recognized by covered employees upon the exercise of compensatory stock options and on the vesting of performance share awards. The TCJA repealed the performance-based compensation exemption under Section 162(m), effective for taxable years beginning after December 31, 2017, subject to certain transition relief. This repeal means that compensation paid to our covered employees in excess of the $1.0 million compensation limitation under Code Section 162(m) will not be deductible unless it qualifies for transition relief applicable to certain arrangements in place as of November 2, 2017, commonly referred to as grandfathered amounts.

In the past, our Compensation Committee generally sought to structure performance-based compensation for our covered employees in a manner that complies with Section 162(m) in order to provide for the deductibility of such compensation to the extent possible. Our Compensation Committee generally will continue to emphasize performance-based compensation, even though it may no longer be deductible. The Compensation Committee has authorized and expects in the future to authorize compensation in excess of $1.0 million to covered employees, which will not be deductible under Section 162(m), when it believes doing so is in the best interests of the Company and our stockholders.

Our Compensation Committee will endeavor to maintain the deductibility of grandfathered amounts going forward, except where it determines in its business judgment that it is in our best interest to provide for compensation that may not be fully deductible. Because of ambiguities and uncertainties as to the application and interpretation of Section 162(m) and the guidance issued thereunder, including the uncertain scope of the transition relief for grandfathered amounts, no assurance can be given that compensation intended to satisfy the requirements for exception from the Section 162(m) deduction limit in fact will satisfy the exception.

Likewise, the impact of Section 409A of the Internal Revenue Code is taken into account, and our executive compensation plans and programs are, in general, designed to comply with the requirements of that section so as to avoid possible adverse tax consequences that may result from non-compliance.

For accounting purposes, we apply the guidance in ASC Topic 718 to record compensation expense for our equity-based compensation grants. ASC Topic 718 is used to develop the assumptions necessary and the model appropriate to value the awards as well as the timing of the expense recognition over the requisite service period, generally the vesting period, of the award.

Executive officers will generally recognize ordinary taxable income from stock option awards when a vested option is exercised. We generally receive a corresponding tax deduction for compensation expense in the year of exercise. The amount included in an NEO's wages and the amount we may deduct is equal to the Common Stock price when the stock options are exercised less the exercise price, multiplied by the number of shares under the stock options exercised. We do not pay or reimburse any NEO for any taxes due upon exercise of a stock option. We have not historically issued any tax-qualified incentive stock options under Section 422 of the Internal Revenue Code.

Executives will generally recognize taxable ordinary income with respect to their shares of restricted stock at the time the restrictions lapse (unless the recipient elects to accelerate recognition as of the date of grant). Restricted stock unit awards are generally subject to ordinary income tax at the time of payment or issuance of unrestricted shares of stock. We are generally entitled to a corresponding federal income tax deduction at the same time the executive recognizes ordinary income.

SUMMARY COMPENSATION TABLE

The following table summarizes the compensation paid to or earned by our named executive officers at December 31, 2019.

Name and Principal Position	Year	Salary ($)	Bonus ($)	Stock Awards ($)	Option Awards ($)	Non-Equity Incentive Plan Compensation ($)	All Other Compensation ($)	Total ($)
Christopher T. Usher	2019	457,412	—	962,000	—	—	7,841	1,427,253
President and CEO	2018	378,560	—	1,023,188	130,427	220,600	7,482	1,760,257
starting June 1, 2019	2017	353,808	—	—	—	347,000	5,504	706,312
Executive Vice President and Chief Operating Officer, Operations Optimization through May 31, 2019								
R. Brian Hanson	2019	276,923	—	—	—	250,000	656,900	1,183,823
President and CEO	2018	600,000	—	1,888,032	262,400	582,000	7,577	3,340,009
through June 1, 2019	2017	558,689	—	—	—	1,200,000	7,950	1,766,639
Steven A. Bate	2019	375,000	—	—	—	281,250	11,250	667,500
Executive Vice President	2018	375,000	—	1,092,322	130,427	273,100	9,548	1,880,397
and Chief Financial Officer	2017	350,484	—	—	—	450,000	7,950	808,434
Kenneth G. Williamson	2019	387,213	—	—	—	—	11,616	398,829
Executive Vice President	2018	387,213	—	1,086,632	130,427	211,500	9,590	1,825,362
and Chief Operating Officer, E&P Technology & Services	2017	361,905	—	—	—	508,000	7,950	877,855
Matthew R. Powers	2019	275,000	—	—	—	—	5,712	280,712
Executive Vice President,	2018	275,000	—	365,943	56,027	160,200	5,654	862,824
General Counsel and Corporate Secretary	2017	220,664	—	168,600	291,540	165,000	5,423	851,227
Scott P. Schwausch Vice President, Corporate Controller and Chief Accounting Officer	2019	200,450	—	—	—	—	5,770	205,818

Discussion of Summary Compensation Table

Stock Awards Column. All of the amounts in the "Stock Awards" column reflect the grant-date fair value of awards of restricted stock made during the applicable fiscal year (excluding any impact of assumed forfeiture rates) under our LTIP. While unvested, a holder of restricted stock is entitled to the same voting rights as all other holders of Common Stock. In each case, unless stated otherwise below, the awards of shares of restricted stock vest in one-third increments each year, over a three-year period. The values contained in the Summary Compensation Table under the Stock Awards column are based on the grant date fair value of all stock awards (excluding any impact of assumed forfeiture rates). The grants and awards listed immediately after this paragraph are grants that were made in 2017 and 2018.

- On March 1, 2018, Mr. Usher received an award of 6,605 shares of restricted stock.
- On December 1, 2018, Mr. Usher received an award of 89,430 shares of restricted stock.
- On March 1, 2018, Mr. Hanson received an award of 7,270 shares of restricted stock.
- On December 1, 2018, Mr. Hanson received an award of 180,000 shares of restricted stock.
- On March 1, 2018, Mr. Bate received an award of 9,035 shares of restricted stock.
- On December 1, 2018, Mr. Bate received an award of 89,430 shares of restricted stock.
- On March 1, 2018, Mr. Williamson received an award of 8,835 shares of restricted stock.
- On December 1, 2018, Mr. Williamson received an award of 89,430 shares of restricted stock.
- On March 1, 2017, Mr. Powers received an award of 12,000 shares of restricted stock.
- On March 1, 2018, Mr. Powers received an award of 242 shares of restricted stock.
- On December 1, 2018, Mr. Powers received an award of 38,443 shares of restricted stock.
- On March 1, 2018, Mr. Schwausch received an award of 242 shares of restricted stock.
- On December 1, 2018, Mr. Schwausch received an award of 9,611 shares of restricted stock

Grants and awards made in 2019 are described in the "*—2019 Grants of Plan-Based Awards*" table below.

Option Awards Column. All of the amounts shown in the "Option Awards" column reflect stock options granted under our 2013 LTIP and stock appreciation rights granted under our 2018 SAR Plan. In each case, unless stated otherwise below, the options vest 1/4 each year over a four-year period and the SARs vest 1/3 per year over a three-year period and also contain a performance-based restriction further described in the footnotes to the next following table. The time-based vesting restrictions are generally contingent on the grantee's continued employment (with certain exceptions that allow earlier vesting, such as in the event of a change of control in the Company's ownership or the death, disability or retirement of the grantee). The values contained in the Summary Compensation Table under the Stock Options column are based on the grant date fair value of all option awards (excluding any impact of assumed forfeiture rates). For a discussion of the valuation assumptions for the awards, see Note 10, *Shareholders' Equity and Stock-Based Compensation—Valuation Assumptions*, in our Notes to Consolidated Financial Statements included in our Annual Report on Form 10-K for the year ended December 31, 2019. All of the exercise prices for the options equal or exceed the fair market value per share of ION Common Stock on the date of grant. In addition to the grants and awards in 2019 described in the *"2019 Grants of Plan-Based Awards"* table below:

- On December 1, 2018, Mr. Usher was granted 95,435 cash-settled SARs having an exercise price of $8.85 per share.
- On December 1, 2018, Mr. Hanson was granted 192,000 cash-settled SARs having an exercise price of $8.85 per share.
- On December 1, 2018, Mr. Bate was granted 95,435 cash-settled SARs having an exercise price of $8.85 per share.
- On December 1, 2018, Mr. Williamson was granted 95,435 cash-settled SARs having an exercise price of $8.85 per share.

- On March 1, 2017, Mr. Powers received an award of options to purchase 36,000 shares of our Common Stock for an exercise price of $13.15 per share.
- On December 1, 2018, Mr. Powers was granted 40,995 cash-settled SARs having an exercise price of $8.85 per share.
- On December 1, 2018, Mr. Schwausch was granted 10,249 cash-settled SARs having an exercise price of $8.85 per share

Other Columns.

Payments of non-equity incentive plan compensation reported for 2019 were made to Mr. Bate in March 2020, and to Mr. Hanson in August 2019, with regard to the 2019 fiscal year and were paid pursuant to their severance agreements.

We do not sponsor for our employees (i) any defined benefit or actuarial pension plans (including supplemental plans), (ii) any non-tax-qualified deferred compensation plans or arrangements or (iii) any nonqualified defined contribution plans.

Our general policy is that our executive officers do not receive any executive "perquisites," or any other similar personal benefits that are different from what our salaried employees are entitled to receive. We provide the named executive officers with certain group life, health, medical and other non-cash benefits generally available to all salaried employees, which are not included in the "All Other Compensation" column in the Summary Compensation Table pursuant to SEC rules.

The amounts shown in the "All Other Compensation" column for all employees, other than Mr. Hanson, solely consist of employer matching contributions to ION's 401(k) plan. Mr. Hanson includes employer matching contributions to ION's 401(k) plan ($5,538), unused vacation pay ($5,205), and severance payments ($646,157).

2019 GRANTS OF PLAN-BASED AWARDS

Name	Grant Date	Estimated Future Payouts Under Non-Equity Incentive Plan Awards(1) Threshold ($)	Target ($)	Maximum ($)	Estimated Future Payouts Under Equity Incentive Plan Awards Threshold ($)	Target ($)	Maximum ($)	All Other Stock Awards: Number of Shares of Stock or Units (#)(2)	All Other Option Awards: Number of Securities Underlying Options (#)	Exercise or Base Price of Option Awards ($/Sh)	Grant Date Fair Value of Stock and Option Awards ($)(3)
Christopher T. Usher . . .	—	—	525,000	1,050,000				—	—	—	—
	9/1/2019							130,000			1,003,600
Steven A. Bate		93,750	281,250	562,500				—	—	—	—
Kenneth G. Williamson .		96,803	290,410	580,820				—	—	—	—
Matthew R. Powers		68,750	165,000	330,000				—	—	—	—
Scott P. Schwausch		50,113	120,270	240,540				—	—	—	—
R. Brian Hanson	—	—	—	—				—	—	—	—

(1) Reflects the estimated threshold, target and maximum award amounts for payouts under our 2019 incentive plan to our NEOs. Under the plan, every participating NEO had the opportunity to earn a maximum of 200% of his target depending on performance of the Company against the designated performance goal, and performance of the executive against personal performance criteria. Mr. Usher's employment agreement does not specify that he will earn a bonus upon achievement of a threshold consolidated performance goal. Because award determinations under the plan were based in part on outcomes of personal evaluations of employee performance by our Chief Executive Officer and the Compensation Committee, the computation of actual awards generated under the plan upon achievement of threshold and target company performance criteria differed from the above estimates. See "—Compensation Discussion and Analysis—Elements of Compensation—Bonus Incentive Plan" above. For actual payout amounts to our named executive officers under our 2019 bonus incentive plan, see the "Non-Equity Incentive Plan Compensation" column in the "Summary Compensation Table" above.

(2) These stock awards were granted to Mr. Usher in September of 2019 under our LTIP. While unvested, a holder of restricted stock is entitled to the same voting rights as all other holders of Common Stock. The shares vest, if at all, in equal increments upon the first, second and third anniversary of the grant. Each vesting tranche is contingent upon the grantee remaining employed by the Company through each applicable anniversary. In addition, one half of the shares granted to Mr. Usher require the Company's volume weighted average stock price to meet or exceed, for twenty consecutive days prior to September 1, 2022, $17.50 for 1/3 of the award to vest; $22.50 for 2/3 of the award to vest; and $27.50 for complete vesting. The performance-based vesting restriction described in the foregoing sentence is in addition to the time-based vesting restriction. Both the time-based vesting restriction and the performance-based vesting restriction are subject to certain exceptions that allow earlier vesting (such as in the event of death, disability, or a change in control of the Company's ownership).

(3) The values contained in the table are based on the grant date fair value of the award computed in accordance with ASC Topic 718 for financial statement reporting purposes, but exclude any impact of assumed forfeiture rates. For a discussion of valuation assumptions, see Note 12, "*Shareholders' Equity and Stock-Based Compensation*", in our Notes to Consolidated Financial Statements included in our Annual Report on Form 10-K for the year ended December 31, 2019.

EMPLOYMENT AGREEMENTS

In recent years, we have not entered into employment agreements with employees other than our Chief Executive Officer and Chief Financial Officer. We have generally entered into employment agreements with employees only when the employee holds an executive officer position and we believe that an employment agreement is desirable for us to obtain a measure of assurance as to the executive's continued employment in light of prevailing market competition for the particular position held by the executive officer, or where we determine that an employment agreement is necessary and appropriate to attract an executive in light of market conditions, the prior experience of the executive or practices at ION with respect to other similarly situated employees.

The following discussion describes the material terms of our existing executive employment agreements with our executive officers:

Christopher T. Usher

In connection with his appointment as our President and Chief Executive Officer on June 1, 2019, Mr. Usher entered into a new employment agreement. The agreement provides for Mr. Usher to serve as our President and Chief Executive Officer through August 31, 2021, with two automatic two-year renewals thereafter.

The agreement provides for Mr. Usher to receive an initial base salary of $525,000 per year and be eligible to receive an annual performance bonus under our incentive compensation plan, with a target incentive plan bonus amount equal to 100% of his base salary. Under our bonus plans, the terms of which are set annually, employees (including the CEO) typically have the potential to earn up to 200% of their target incentive bonus amount.

Under the agreement, and as approved by the Compensation Committee, Mr. Usher will be eligible to receive grants of (i) options to purchase shares of our Common Stock, (ii) shares of our restricted stock and (iii) stock appreciation rights (SARs). Mr. Usher will also be eligible to participate in other equity compensation plans that are established for our key executives, as approved by the Compensation Committee. In the agreement, we also agreed to indemnify Mr. Usher to the fullest extent permitted by our Restated Certificate of Incorporation, as amended, and Bylaws, and to provide him coverage under our directors' and officers' liability insurance policies to the same extent as other company executives.

We may at any time terminate our employment agreement with Mr. Usher for "Cause", with no severance obligations, if Mr. Usher (i) is convicted of a felony; (ii) engages in dishonesty, willful misconduct or gross neglect that results in material injury to the Company; (iii) appropriates, or attempts to appropriate, a material business opportunity of the Company; (iv) steals or embezzles from the Company; or (v) fails, after notice, to follow the reasonable instructions of the Company with respect to his employment. Any other termination by us would trigger severance obligations, as would Mr. Usher's resignation if we adversely change his title or materially change his responsibilities, authority or status without prior notice and acceptance; substantially fail to comply with our obligations under his agreement; materially reduce his base salary or bonus opportunity without prior notice and acceptance (unless in connection with a broad-based reduction for senior executives of the Company); fail to obtain the assumption of his agreement by any successor or assignee of the Company; require him to relocate more than fifty miles from the Company's current headquarters location; or refuse, without Cause, to renew his agreement for any of the three additional terms commencing on September 1, 2021, September 1, 2023, or September 1, 2025 (each of the foregoing constituting "good reason" under the agreement for him to resign).

In his agreement, Mr. Usher agrees not to compete against us, assist any competitor, attempt to solicit any of our suppliers or customers, or solicit any of our employees, in any case during his employment and for a period of two years after his employment ends. The employment agreement also contains provisions relating to protection of our confidential information and intellectual property. The agreement does not contain any tax gross-up benefits.

For a discussion of the provisions of Mr. Usher's employment agreement regarding compensation to Mr. Usher in the event of a change of control affecting our Company or his termination by us without cause or by him for good reason, see "*—Potential Payments Upon Termination or Change of Control—Christopher T. Usher*" below.

Steven A. Bate

Mr. Bate was our Chief Financial Officer until he stepped down from that role effective February 1, 2020.

In connection with his appointment as our Executive Vice President and Chief Financial Officer on November 13, 2014, Mr. Bate entered into an employment agreement. The agreement provides for Mr. Bate to serve as our Executive Vice President and Chief Financial Officer for an initial term of three years, with automatic one-year renewals thereafter. Any change of control of our Company after November 13, 2015 would have caused the remaining term of Mr. Bate's employment agreement to adjust automatically to a term of two years, which would have commenced on the effective date of the change of control.

The agreement provided for Mr. Bate to receive an initial base salary of $375,000 per year, and he was eligible to receive an annual performance bonus under our incentive compensation plan, with a target incentive plan bonus amount equal to 50% of his base salary beginning in 2015.

Under the agreement, Mr. Bate was eligible to receive grants of (i) options to purchase shares of our Common Stock and (ii) shares of our restricted stock. Mr. Bate was also eligible to participate in other equity compensation plans that are established for our key executives, as approved by the Compensation Committee. In the agreement, we also agreed to indemnify Mr. Bate to the fullest extent permitted by our Restated Certificate of Incorporation, as amended, and Bylaws, and to provide him coverage under our directors' and officers' liability insurance policies to the same extent as other company executives.

We could at any time terminate our employment agreement with Mr. Bate for "Cause" if Mr. Bate (i) willfully and continuously failed to substantially perform his obligations, (ii) willfully engaged in conduct materially and demonstrably injurious to our property or business (including fraud, misappropriation of funds or other property, other willful misconduct, gross negligence or conviction of a felony or any crime involving moral turpitude) or (iii) committed a material breach of the agreement. Mr. Bate could terminate his employment agreement for "Good Reason" if we breached any material provision of the agreement, assigned to Mr. Bate any duties materially inconsistent with his position, materially reduce his duties, functions, responsibilities, budgetary or other authority, or took other action that resulted in a diminution in his office, position, duties, functions, responsibilities or authority, or we relocated his workplace by more than 50 miles.

In his agreement, Mr. Bate agreed not to compete against us, assist any competitor, attempt to solicit any of our suppliers or customers, or solicit any of our employees, in any case during his employment and for a period of twelve months after his employment ends. The employment agreement also contained provisions relating to protection of our confidential information and intellectual property.

A discussion of the provisions of Mr. Bate's employment agreement regarding compensation to Mr. Bate in the event of a change of control affecting our Company or his termination by us without cause or by him for good reason as of December 31, 2019, see "*—Potential Payments Upon Termination* *or Change of Control—Steven A. Bate*" below. (Note that Mr. Bate stepped down from his role as Chief Financial Officer in February of 2020).

R. Brian Hanson

Mr. Hanson was our Chief Executive Officer until his retirement from the Company on June 1, 2019.

In connection with his appointment as our President and Chief Executive Officer on January 1, 2012, Mr. Hanson entered into a new employment agreement. The agreement provided for Mr. Hanson to serve as our President and Chief Executive Officer for an initial term of three years, with automatic two-year renewals thereafter. Any change of control of our Company after January 1, 2013 would have caused the remaining term of Mr. Hanson's employment agreement to adjust automatically to a term of three years, which would have commenced on the effective date of the change of control.

The agreement provided for Mr. Hanson to receive an initial base salary of $450,000 per year and be eligible to receive an annual performance bonus under our incentive compensation plan, with a target incentive plan bonus amount equal to 75% of his base salary and with a maximum incentive plan bonus amount equal to 150% of his base salary.

Under the agreement, and as approved by the Compensation Committee, Mr. Hanson was eligible to receive grants of (i) options to purchase shares of our Common Stock and (ii) shares of our restricted stock. Mr. Hanson was also eligible to participate in other equity compensation plans that are established for our key executives, as approved by the Compensation Committee. In the agreement, we also agreed to indemnify Mr. Hanson to the fullest extent permitted by our Restated Certificate of Incorporation, as amended, and Bylaws, and to provide him coverage under our directors' and officers' liability insurance policies to the same extent as other company executives.

We could at any time terminate our employment agreement with Mr. Hanson for "Cause" if Mr. Hanson (i) willfully and continuously failed to substantially perform his obligations, (ii) willfully engaged in conduct materially and demonstrably injurious to our property or business (including fraud, misappropriation of funds or other property, other willful misconduct, gross negligence or conviction of a felony or any crime involving moral turpitude) or (iii) committed a material breach of the agreement. In addition, we could at any time terminate the agreement if Mr. Hanson suffered permanent and total disability for a period of at least 180 consecutive days, or if Mr. Hanson died. Mr. Hanson could terminate his employment agreement for "Good Reason" if we breached any material provision of the agreement, we assigned to Mr. Hanson any duties materially inconsistent with his position, we materially reduced his duties, functions, responsibilities, budgetary or other authority, or took other action that resulted in a diminution in his office, position, duties, functions, responsibilities or authority, we relocated his workplace by more than 50 miles, or we elected not to extend the term of his agreement.

In his agreement, Mr. Hanson agreed not to compete against us, assist any competitor, attempt to solicit any of our suppliers or customers, or solicit any of our employees, in any case during his employment and for a period of two years after his employment ended. The employment agreement also contained provisions relating to protection of our confidential information and intellectual property. The agreement did not contain any tax gross-up benefits.

OUTSTANDING EQUITY AWARDS AT FISCAL YEAR-END

The following table sets forth information concerning unexercised stock options (including outstanding stock appreciation rights, or SARs) and shares of restricted stock held by our named executive officers at December 31, 2019:

	Option Awards(1)					Stock Awards(2)			
Name	Number of Securities Underlying Unexercised Options (#) Exercisable	Number of Securities Underlying Unexercised Options (#) Unexercisable	Equity Incentive Plan Awards: Number of Securities Underlying Unexercised Unearned Options (#)	Option Exercise Price ($)	Option Expiration Date	Number of Shares or Units of Stock That Have Not Vested (#)(3)	Market Value of Shares or Units of Stock That Have Not Vested ($)	Equity Incentive Plan Awards: Number of Unearned Shares, Units or other Rights That Have Not Vested (#)(4)	Equity Incentive Plan Awards: Market or Payout Value of Unearned Shares, Units or Other Rights That Have Not Vested ($)
Christopher T. Usher	3,333	—	0	89.40	12/1/2022	65,000	564,200	154,430	1,340,452
	4,000	—	0	57.90	12/1/2023				
	4,000	—	0	61.05	3/1/2024				
	2,830	—	0	34.20	3/1/2025				
	18,750	6,250	0	3.10	3/1/2026				
	50,000	—	—(5)	3.10	3/1/2026				
	—	—	95,435(6)	8.85	12/1/2028				
Steven A. Bate	8,333	—	—	95.85	6/1/2023	—	—	89,430	776,252
	2,333	—	0	57.90	12/1/2023				
	3,333	—	0	61.05	3/1/2024				
	4,000	—	0	37.05	12/1/2024				
	5,898	—	0	34.20	3/1/2025				
	37,500	12,500	0	3.10	3/1/2026				
	50,000	—	0(5)	3.10	3/1/2026				
	—	—	95,435(6)	8.85	12/1/2028				
Kenneth G. Williamson	5,000	—	—	68.70	3/1/2020	—	—	89,430	776,252
	2,333	—	—	107.85	12/1/2020				
	3,333	—	0	87.15	12/1/2021				
	3,333	—	0	89.40	12/1/2022				
	4,000	—	—	57.90	12/1/2023				
	4,000	—	0	61.05	3/1/2024				
	7,001	—	—	34.20	3/1/2025				
	26,250	8,750	0	3.10	3/1/2026				
	50,000	—	—(5)	3.10	3/1/2026				
	—	—	95,435(6)	8.85	12/1/2028				
Matthew R. Powers	333	—	—	71.85	9/1/2023	4,000	34,720	38,443	333,685
	333	—	—	57.90	12/1/2023				
	500	—	—	61.05	3/1/2024				
	3,750	1,250	—	3.10	3/1/2026				
	3,334	—	—(5)	3.10	3/1/2026				
	18,000	18,000	—	13.15	12/1/2027				
	—	—	40,995(5)	8.85	12/1/2028				
Scott P. Schwausch	533	—	—	107.85	12/1/2020	—	—	9,611	83,423
	640	—	—	87.15	12/1/2021				
	800	—	—	89.40	12/1/2022				
	1,000	—	—	57.90	12/1/2023				
	1,000	—	—	61.05	3/1/2024				
	3,750	1,250	—	3.10	3/1/2026				
	3,334	—	—(5)	3.10	3/1/2026				
	—	—	10,249(6)	8.85	12/1/2028				
(7)									

(1) All stock option information in this table relates to nonqualified stock options granted under either our 2004 LTIP or 2013 LTIP. All of the unvested options in this table vest, if at all, 25% each year over a four-year period, generally contingent on continued employment

of the grantee (with certain exceptions that allow earlier vesting such as in the event of death, disability, or retirement of the grantee or a change in control of the Company's ownership).

(2) Pursuant to SEC rules, the market value of each executive's shares of unvested restricted stock was calculated by multiplying the number of shares by $8.68 (the closing price per share of our Common Stock on the NYSE on December 31, 2019).

(3) The amounts shown represent shares of restricted stock granted under our LTIP. While unvested, the holder is entitled to the same voting rights as all other holders of Common Stock. All of the restricted stock awards are subject to the time-based vesting restrictions.

(4) The amounts shown represent shares of restricted stock granted under our LTIP. While unvested, the holder is entitled to the same voting rights as all other holders of Common Stock. All of the restricted stock awards are subject to the time-based vesting restrictions. The shares of restricted stock awarded will vest in one-third increments each year over a three-year period, conditioned upon the recipient's continued employment during that time; however, in addition to this time-based vesting restriction, none of the awards will vest unless certain performance measures are satisfied, as follows:

If the 20-day volume weighted average price (the "VWAP") per share of the Company's common stock does not meet or exceed $17.50, none of the shares shall vest; if the VWAP meets or exceeds $17.50 but does not meet or exceed $22.50, 1/3 of the shares shall vest; if the VWAP meets or exceeds $22.50 but does not meet or exceed $27.50, 2/3 of the shares shall vest; and for full vesting, the VWAP must meet or exceed $27.50. The performance measures are in addition to the time-based vesting restriction, and *vice versa.*

(5) The amounts shown reflect awards of cash-settled SARs granted on March 1, 2016 under our 2008 Stock Appreciation Rights Plan ("2008 SAR Plan").

(6) The amounts shown reflect awards of cash-settled SARs granted on December 1, 2018 under our SAR Plan. The shares of restricted stock awarded will vest in one-third increments each year over a three-year period, conditioned upon the recipient's continued employment during that time; however, in addition to this time-based vesting restriction, none of the awards will vest unless certain performance measures are satisfied. The SARS have the same time-based and performance based vesting restrictions as the restricted stock, described above. The maximum value of each SAR is $18.65 per share.

(7) Information about R. Brian Hanson, who ceased being an NEO in June 2019, is not in this table.

2019 OPTION EXERCISES AND STOCK VESTED

The following table sets forth certain information with respect to option and stock exercises by the named executive officers during the year ended December 31, 2019:

	Option Awards		Stock Awards	
Name	Number of Shares Acquired on Exercise (#)	Value Realized on Exercise ($)(1)	Number of Shares Acquired on Vesting (#)	Value Realized on Vesting ($)(2)
Christopher T. Usher(3)	—	—	4,599	60,572
R. Brian Hanson(4)	150,000	961,500	143,332	1,155,585
Steven A. Bate(5)	—	—	11,666	139,193
Kenneth G. Williamson(6)	—	—	5,833	80,379
Matthew R. Powers(7)	—	—	4,666	41,057
Scott P. Schwausch(8)	—	—	666	9,177

(1) The value realized upon the exercise of the non-qualified stock options (the "NQSOs") and stock appreciation rights (the "SARs") was calculated by (a) subtracting $3.10 (the exercise price) from $9.51 (the closing price per share of our Common Stock on September 12, 2019 the date of exercise) to get the realized value per share, and (b) multiplying the realized value per share by the number of shares underlying shares exercised.

(2) The values realized upon vesting of stock awards contained in the table are based on the market value of our Common Stock on the date of vesting.

(3) The value realized by Mr. Usher on the vesting of his restricted stock awards was calculated by multiplying (a) 4,166 shares by $13.78 (the closing price per share of our Common Stock on March 1, 2019, the vesting date) and (b) 433 shares by $7.31 (the closing price per share of our Common Stock on June 3, 2019, the first business day after the vesting date).

(4) The value realized by Mr. Hanson on the vesting of his restricted stock awards was calculated by multiplying (a) 16,666 shares by $13.78 (the closing price per share of our Common Stock on March 1, 2019, the vesting date) and (b) 126,666 shares by $7.31 (the closing price per share of our Common Stock on June 3, 2019, the first business day after the vesting date). Mr. Hanson retired from ION on June 1, 2019. Information for Mr. Hanson may be incomplete, as his reporting obligations ceased when he left the Company in June, 2019.

(5) The value realized by Mr. Bate on the vesting of his restricted stock awards was calculated by multiplying (a) 8,333 shares by $13.78 (the closing price per share of our Common Stock on March 1, 2019, the vesting date) and (b) 3,333 shares by $7.31 (the closing price per share of our Common Stock on June 3, 2019, the first business day after the vesting date).

(6) The value realized by Mr. Williamson on the vesting of his restricted stock awards was calculated by multiplying 5,833 shares by $13.78 (the closing price per share of our Common Stock on March 1, 2019, the vesting date).

(7) The value realized by Mr. Powers on the vesting of his restricted stock awards was calculated by multiplying (a) 666 shares by $13.78 (the closing price per share of our Common Stock on March 1, 2019, the vesting date) and (b) 4,000 shares by $7.97 (the closing price per share of our Common Stock on December 2, 2019, the first business day after the vesting date).

(8) The value realized by Mr. Schwausch on the vesting of his restricted stock awards was calculated by multiplying 666 shares by $13.78 (the closing price per share of our Common Stock on March 1, 2019, the vesting date).

POTENTIAL PAYMENTS UPON TERMINATION OR CHANGE OF CONTROL

Under the terms of our equity-based compensation plans and our employment agreements, our Chief Executive Officer and certain of our other named executive officers are entitled to payments and benefits upon the occurrence of specified events including termination of employment (with and without cause) and upon a change in control of our Company. The specific terms of these arrangements, as well as an estimate of the compensation that would have been payable had they been triggered as of December 31, 2019, are described in detail below. In the case of each employment agreement, the terms of these arrangements were established through the course of arms-length negotiations with each executive officer, both at the time of hire and at the times of any later amendment. As part of these negotiations, the Compensation Committee analyzed the terms of the same or similar arrangements for comparable executives employed by companies in our industry group. This approach was used by the committee in setting the amounts payable and the triggering events under the arrangements. The termination of employment provisions of the employment agreements were entered into in order to address competitive concerns by providing those individuals with a fixed amount of compensation that would offset the potential risk of leaving their prior employer or foregoing other opportunities in order to join our Company. At the time of entering into these arrangements, the Compensation Committee considered the aggregate potential obligations of our Company in the context of the desirability of hiring the individual and the expected compensation upon joining us. However, these contractual severance and post-termination arrangements have not affected the decisions the Compensation Committee has made regarding other compensation elements and the rationale for compensation decisions made in connection with these arrangements.

The following summaries set forth estimated potential payments payable to each of our named executive officers upon termination of employment or a change of control of our Company under their current employment agreements and our stock plans and other compensation programs as if his employment had so terminated for these reasons, or the change of control had so occurred, on December 31, 2019. The Compensation Committee may, in its discretion, agree to revise, amend or add to the benefits if it deems advisable. For purposes of the following summaries, dollar amounts are estimates based on annual base salary as of December 31, 2019, benefits paid to the named executive officer in fiscal 2019 and stock and option holdings of the named executive officer as of December 31, 2019. The summaries assume a price per share of ION Common Stock of $8.68 per share, which was the closing price per share on December 31, 2019, as reported on the NYSE. The actual amounts to be paid to the named executive officers can only be determined at the time of each executive's separation from the Company.

The amounts of potential future payments and benefits as set forth in the tables below, and the descriptions of the assumptions upon which such future payments and benefits are based and derived, may constitute "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995. These statements are estimates of payments and benefits to certain of our executives upon their termination of employment or a change in control, and actual payments and benefits may vary materially from these estimates. Actual amounts can only be determined at the time of such executive's actual separation from our Company or the time of such change in control event. Factors that could affect these amounts and assumptions include the timing during the year of any such event, the price of our Common Stock, unforeseen future changes in our Company's benefits and compensation methodology and the age of the executive.

Christopher T. Usher

Termination and Change of Control. Mr. Usher is entitled to certain benefits under his employment agreement upon the occurrence of any of the following events:

- we terminate his employment other than for cause, death or disability;

- Mr. Usher resigns for "good reason" (as described in "*—Employment Agreements—Christopher T. Usher*", above, which includes the failure, by a successor-in-interest to the Company, to assume the terms of his employment agreement).

Under Mr. Usher's employment agreement, a "change in control" occurs upon any of the following (which we refer to in this section as an "Employment Agreement Change of Control"):

Upon the occurrence of any of the above events and conditions, Mr. Usher would be entitled to receive the following (less applicable withholding taxes and subject to compliance with non-compete, non-solicit and no-hire obligations):

- over a two-year period, a cash amount equal to two times his annual base salary in effect for the year of termination;
- continuation of insurance coverage for Mr. Usher as of the date of his termination for a period of two years at the same cost to him as prior to the termination.

In addition, upon the occurrence of any of the above events or conditions, any time-based vesting restriction which would have been removed, had Mr. Usher remained employed for two years after the last date of his employment, will be lifted (but such awards will remain subject to the applicable performance vesting conditions and shall become fully vested only if, and only to the extent, the applicable performance conditions (such as, for example, the Company's stock achieving and maintaining a certain price) are satisfied as provided under the applicable granting agreement).

We believe the double-trigger change-of-control benefit referenced above maximizes shareholder value because it motivates Mr. Usher to remain in his position following a change of control to ensure a smoother integration and transition for the new owners. Given his experience with our Company and within the seismic industry as our CFO and CEO, we believe Mr. Usher's severance structure is in our best interest because it ensures that for a two-year period after leaving our employment, Mr. Usher will not be in a position to compete against us or otherwise adversely affect our business.

Change of Control Under Equity Compensation Plans. Mr. Usher and our other named executive officers currently hold outstanding awards under one or more of the following five equity compensation plans: our 2004 LTIP, our 2013 LTIP, our 2018 LTIP, our 2008 SAR Plan and our 2018 SAR Plan. Under these plans, a "change of control" will be deemed to have occurred upon any of the following (which we refer to in this section as a "*Plan Change of Control*"):

(1) the acquisition by a person or group of beneficial ownership of 40% or more of the outstanding shares of Common Stock other than acquisitions directly from ION, acquisitions by ION or an employee benefit plan maintained by ION, or certain permitted acquisitions in connection with a business combination described in sub-paragraph (3) below;

(2) changes in directors such that the individuals that constitute the entire board of directors cease to constitute at least a majority of directors of the board, other than new directors whose appointment or nomination for election was approved by a vote of at least a majority of the directors then constituting the entire board of directors (except in the case of election contests);

(3) consummation of a reorganization, merger, consolidation or similar business combination involving ION, unless (i) owners of our Common Stock immediately following such transaction together own more than 50% of the total outstanding stock or voting power of the entity resulting from the transaction and (ii) at least a majority of the members of the board of directors of the entity resulting from the transaction were members of our board of directors at the time the agreement for the transaction is signed; or

(4) the sale of all or substantially all of our assets.

Upon any such "Plan Change of Control," all of Mr. Usher's stock options granted to him under the LTIP will become fully exercisable, all unvested restricted stock awards granted to him under the LTIP before September of 2019 will automatically accelerate and become fully vested, and all unvested stock appreciation rights granted to him under the 2018 SAR Plan will become fully exercisable. However, all unvested restricted stock awards granted to him in September of 2019 are subject to a "double trigger" for early vesting on change in control.

Death, Disability or Retirement. Upon his death or disability, all unvested options, restricted stock and stock appreciation rights that Mr. Usher holds would automatically accelerate and become fully vested (except 65,000 of the shares of restricted stock granted to him in September of 2019 will remain subject to the performance vesting conditions, relating to the Company's stock price, and shall become fully vested only if, and only to the extent, the applicable performance conditions are satisfied as provided under the applicable granting agreement). Upon his retirement, all unvested options and stock appreciation rights that Mr. Usher holds would automatically accelerate and become fully vested. No unvested shares of restricted stock held by Mr. Usher would automatically accelerate and become fully vested upon his retirement.

Termination by Us for Cause or by Mr. Usher Other Than for Good Reason. Upon any termination by us for cause or any resignation by Mr. Usher for any reason other than for "good reason" (as defined in his employment agreement), Mr. Usher is not entitled to any payment or benefit other than the payment of unpaid salary and possibly accrued and unused vacation pay.

Mr. Usher's currently-held vested stock options and stock appreciation rights will remain exercisable after his termination of employment, death, disability or retirement for periods of between three months and one year following such event, depending on the event and the terms of the applicable plan and grant agreement. If Mr. Usher is terminated for cause, all of his vested and unvested stock options, unvested restricted stock, and vested and unvested stock appreciation rights will be immediately forfeited. We have not agreed to provide Mr. Usher any additional payments in the event any payment or benefit under his employment agreement is determined to be subject to the excise tax for "excess parachute payments" under U.S. federal income tax rules, or any other "tax gross-ups" under this employment agreement.

Assuming Mr. Usher's employment was terminated under each of these circumstances or a change of control occurred on December 31, 2019, his payments and benefits would have an estimated value as follows (less applicable withholding taxes):

Scenario	Cash Severance ($)(1)	Bonus ($)(2)	Insurance Continuation ($)(3)	Tax Gross-Ups ($)	Value of Accelerated Equity Awards ($)(4)
Without Cause or For Good Reason	1,050,000	1,050,000	41,309	—	—
Termination after change in control	1,050,000	1,050,000	41,309	—	1,939,527
Change of Control (if not terminated), Death or Disability	—	—	—	—	1,939,527
Retirement	—	—	—	—	34,875
Voluntary Termination	—	—	—	—	—

(1) Payable over a two-year period. In addition to the listed amounts, if Mr. Usher resigns or his employment is terminated for any reason, he may be paid for his unused vacation days. Mr. Usher is currently entitled to accrue up to 25 vacation days per year. The above table assumes that there is no earned but unpaid base salary as of the time of termination.

(2) Represents two times the estimate of the target bonus payment Mr. Usher would be entitled to receive pursuant to our 2019 bonus incentive plan. The actual bonus payment he would be entitled

to receive upon his termination may be different from the estimated amount, depending on the achievement of payment criteria under the bonus plan.

(3) The value of insurance continuation contained in the above table is the total cost of COBRA continuation coverage for Mr. Usher, maintaining his same levels of medical, dental and other insurance as in effect on December 31, 2019, less the amount of premiums to be paid by Mr. Usher for such coverage.

(4) As of December 31, 2019, Mr. Usher held 219,430 unvested shares of restricted stock, unvested stock options to purchase 6,250 shares of Common Stock and 95,435 unvested cash-settled stock appreciation rights. The value of accelerated unvested options was calculated by multiplying 6,250 shares underlying Mr. Usher's unvested options by $8.68 (the closing price per share on December 31, 2019) and then deducting the aggregate exercise price for those shares (equal to $3.10 per share for those 6,250 options). The value of the restricted stock that would accelerate and fully vest in the event of a Change in Control, death or disability was calculated by multiplying 219,430 shares by $8.68. Stock appreciation rights having an exercise price greater than $8.68 were calculated as having a zero value.

Steven A. Bate

Termination and Change of Control. Mr. Bate would have been entitled to certain benefits under his employment agreement upon the occurrence of any of the following events:

- we terminated his employment other than for cause, death or disability;
- Mr. Bate resigned for "good reason"; or
- an "Employment Agreement Change of Control" involving our Company occurred and, within 12 months following the change in control, (a) we or our successor terminated Mr. Bate's employment or (b) Mr. Bate terminated his employment after we or our successor (i) elected not to extend the term of his employment agreement, (ii) assigned to Mr. Bate duties inconsistent with his CFO position, duties, functions, responsibilities, authority or reporting relationship to the Board under his employment agreement, (iii) we became a privately-owned company as a result of a transaction in which Mr. Bate did not participate within the acquiring group, (iv) were rendered a subsidiary or division or other unit of another company; or (v) took any action that would constitute "good reason" under his employment agreement.

Upon the occurrence of any of the above events and conditions, Mr. Bate would have been entitled to receive the following (less applicable withholding taxes and subject to compliance with non-compete, non-solicit and no-hire obligations):

- over a two-year period, a cash amount equal to two times his annual base salary in effect for the year of termination;
- a prorated portion of any unpaid target incentive plan bonus for the year of termination; and
- continuation of insurance coverage for Mr. Bate as of the date of his termination for a period of eighteen months at the same cost to him as prior to the termination.

Change of Control Under Equity Compensation Plans. Upon a "Plan Change of Control", (see "*—Christopher T. Usher—Change of Control Under Equity Compensation Plans*" above), all of Mr. Bate's stock options granted to him under the 2013 LTIP would have become fully exercisable, all unvested restricted stock awards granted to him under the 2018 LTIP would have been automatically accelerate and become fully vested, and all unvested stock appreciation rights granted to him under the 2018 SAR Plan would have become fully exercisable. In addition, any change of control of our Company would have caused the remaining term of Mr. Bate's employment agreement to adjust automatically to two years, commencing on the effective date of the change of control.

Upon his death or disability, all unvested options, restricted stock and stock appreciation rights that Mr. Bate holds would have automatically accelerated and become fully vested. Upon his retirement, all unvested options and stock appreciation rights that Mr. Bate held would have automatically accelerated and become fully vested. No unvested shares of restricted stock held by Mr. Bate would automatically accelerate and become fully vested upon his retirement.

Upon any termination by us for cause or any resignation by Mr. Bate for any reason other than for "good reason" (as defined in his employment agreement), Mr. Bate would not have been entitled to any payment or benefit other than the payment of unpaid salary and possibly accrued and unused vacation pay.

Mr. Bate's currently-held vested stock options and stock appreciation rights would have remained exercisable after his termination of employment, death, disability or retirement for periods of between three months and one year following such event, depending on the event and the terms of the applicable plan and grant agreement. If Mr. Bate was terminated for cause, all of his vested and unvested stock options, unvested restricted stock, and vested and unvested stock appreciation rights would have been immediately forfeited.

Assuming Mr. Bate employment were terminated under each of these circumstances or a change of control occurred on December 31, 2019, his payments and benefits would have an estimated value as follows (less applicable withholding taxes):

Scenario	Cash Severance ($)(1)	Bonus ($)(2)	Insurance Continuation ($)(3)	Value of Accelerated Equity Awards ($)(4)
Without Cause or For Good Reason	750,000	—	33,274	—
Termination after change in control	750,000	—	33,274	846,002
Change of Control (if not terminated), Death or Disability	—	—	—	846,002
Retirement	—	—	—	69,750
Voluntary Termination	—	—	—	—

(1) Payable over a two-year period. In addition to the listed amounts, if Mr. Bate resigns or his employment is terminated for any reason, he may be paid for his unused vacation days. Mr. Bate is currently entitled to accrue up to 30 vacation days per year. The above table assumes that there is no earned but unpaid base salary as of the time of termination.

(2) The actual bonus payment he would be entitled to receive upon his termination may be different from the estimated amount, depending on the achievement of payment criteria under the bonus plan.

(3) The value of insurance continuation contained in the above table is the total cost of COBRA continuation coverage for Mr. Bate, maintaining his same levels of medical, dental and other insurance as in effect on December 31, 2019, less the amount of premiums to be paid by Mr. Bate for such coverage.

(4) As of December 31, 2019, Mr. Bate held 89,430 unvested shares of restricted stock, unvested stock options to purchase 12,500 shares of Common Stock and 95,435 unvested cash-settled stock appreciation rights. The value of accelerated unvested options was calculated by multiplying 12,500 shares underlying Mr. Bate's unvested options by $8.68

(the closing price per share on December 31, 2019) and then deducting the aggregate exercise price for those shares (equal to $3.10 per share for those 12,500 options). The value of the restricted stock that would accelerate and fully vest in the event of a Change in Control, death or disability was calculated by multiplying 89,430 shares by $8.68. Stock appreciation rights having an exercise price greater than $8.68 per share were calculated as having a zero value.

Matthew R. Powers

Mr. Powers is not entitled to receive any contractual severance pay if we terminate his employment without cause. Upon a "Plan Change of Control" (see "*—Christopher T. Usher—Change of Control Under Equity Compensation Plans*" above), all of his unvested stock options granted to him under the 2013 LTIP will become fully exercisable, all unvested restricted stock awards granted to him under the 2018 LTIP will automatically accelerate and become fully vested, and all unvested stock appreciation rights granted to him under the 2018 SAR Plan will become fully exercisable. Upon his death or disability, all unvested options, restricted stock and stock appreciation rights that Mr. Powers holds would automatically accelerate and become fully vested. Upon his retirement, all unvested options and stock appreciation rights that Mr. Powers holds would automatically accelerate and become fully vested. No shares of unvested restricted stock held by Mr. Powers would automatically accelerate and become fully vested upon his retirement.

The vested stock options and stock appreciation rights held by Mr. Powers will remain exercisable after his termination of employment, death, disability or retirement for periods of between three months and one year following such event, depending on the event and the terms of the applicable stock plan and grant agreement. If Mr. Powers is terminated for cause, all of his vested and unvested stock options, unvested restricted stock, and vested and unvested stock appreciation rights will be immediately forfeited.

Assuming his employment was terminated under each of these circumstances or a change of control occurred on December 31, 2019, his payments and benefits would have an estimated value as follows (less applicable withholding taxes):

Scenario	Cash Severance ($)(1)	Value of Accelerated Equity Awards ($)(2)
Without Cause	—	—
Change of Control (regardless of termination), Death or Disability	—	375,380
Retirement	—	6,975
Voluntary Termination	—	—

(1) If Mr. Powers resigns or his employment is terminated for any reason, he may be paid for his unused vacation days. Mr. Powers is currently entitled to accrue up to 25 vacation days per year. The above table assumes that there is no earned but unpaid base salary as of the time of termination.

(2) As of December 31, 2019, Mr. Powers held 42,443 unvested shares of restricted stock, unvested stock options to purchase 19,250 shares of Common Stock and 40,995 unvested cash-settled stock appreciation rights. The value of accelerated unvested options was calculated by multiplying 1,250 shares underlying Mr. Powers' unvested options by $8.68 (the closing price per share on December 31, 2019) and then deducting the aggregate exercise price for those shares (equal to $3.10 per share for 1,250 options). The options having an exercise price greater than $8.68 per share were calculated as having a zero

value. The value of the restricted stock that would accelerate and fully vest in the event of a Change in Control, death or disability was calculated by multiplying 42,443 shares by $8.68. Stock appreciation rights having an exercise price greater than $8.68 per share were calculated as having a zero value.

Scott P. Schwausch

Mr. Schwausch is not entitled to receive any contractual severance pay if we terminate his employment without cause. Upon a "Plan Change of Control" (see "*—Christopher T. Usher—Change of Control Under Equity Compensation Plans*" above), all of his unvested stock options granted to him under the 2013 LTIP will become fully exercisable, all restricted stock awards granted to him under the 2018 LTIP will automatically accelerate and become fully vested, and all unvested stock appreciation rights granted to him under the 2018 SAR Plan will become fully exercisable. Upon his death or disability, all unvested options, restricted stock and stock appreciation rights that Mr. Schwausch holds would automatically accelerate and become fully vested. Upon his retirement, all unvested options and stock appreciation rights that Mr. Schwausch holds would automatically accelerate and become fully vested. No unvested shares of restricted stock held by Mr. Schwausch would automatically accelerate and become fully vested upon his retirement.

The vested stock options and stock appreciation rights held by Mr. Schwausch will remain exercisable after his termination of employment, death, disability or retirement for periods of between three months and one year following such event, depending on the event and the terms of the applicable stock plan and grant agreement. If Mr. Schwausch is terminated for cause, all of his vested and unvested stock options, unvested restricted stock, and vested and unvested stock appreciation rights will be immediately forfeited.

Assuming his employment was terminated under each of these circumstances or a change of control occurred on December 31, 2019, his payments and benefits would have an estimated value as follows (less applicable withholding taxes):

Scenario	Cash Severance ($)(1)	Value of Accelerated Equity Awards ($)(2)
Without Cause	—	—
Change of Control (regardless of termination), Death or Disability	—	90,398
Retirement	—	6,975
Voluntary Termination	—	—

(1) If Mr. Schwausch resigns or his employment is terminated for any reason, he may be paid for his unused vacation days. Mr. Schwausch is currently entitled to accrue up to 25 vacation days per year. The above table assumes that there is no earned but unpaid base salary as of the time of termination.

(2) As of December 31, 2019, Mr. Schwausch held 9,611 unvested shares of restricted stock, unvested stock options to purchase 1,250 shares of Common Stock and 20,498 unvested cash-settled stock appreciation rights. The value of accelerated unvested options was calculated by multiplying 1,250 shares underlying Mr. Schwausch's unvested options by $8.68 (the closing price per share on December 31, 2019) and then deducting the aggregate exercise price for those shares (equal to $3.10 per share for those 1,250 options). The value of the restricted stock that would accelerate and fully vest in the event of a Change in Control, death or disability was calculated by multiplying 9,611

shares by $8.68. Stock appreciation rights having an exercise price greater than $8.68 per share were calculated as having a zero value.

Kenneth G. Williamson

Mr. Williamson is not entitled to receive any contractual severance pay if we terminate his employment without cause. Upon a "Plan Change of Control" (see "*—Christopher T. Usher—Change of Control Under Equity Compensation Plans*" above), all of his unvested stock options granted to him under the 2013 LTIP will become fully exercisable, all unvested restricted stock awards granted to him under the 2018 LTIP will automatically accelerate and become fully vested, and all unvested stock appreciation rights granted to him under the 2018 SAR Plan will become fully exercisable. Upon his death or disability, all unvested options, restricted stock and stock appreciation rights that Mr. Williamson holds would automatically accelerate and become fully vested. Upon his retirement, all unvested options and stock appreciation rights that Mr. Williamson holds would automatically accelerate and become fully vested. No unvested shares of restricted stock held by Mr. Williamson would automatically accelerate and become fully vested upon his retirement.

The vested stock options and stock appreciation rights held by Mr. Williamson will remain exercisable after his termination of employment, death, disability or retirement for periods of between three months and one year following such event, depending on the event and the terms of the applicable stock plan and grant agreement. If Mr. Williamson is terminated for cause, all of his vested and unvested stock options, unvested restricted stock, and vested and unvested stock appreciation rights will be immediately forfeited.

Assuming his employment was terminated under each of these circumstances or a change of control occurred on December 31, 2019, his payments and benefits would have an estimated value as follows (less applicable withholding taxes):

Scenario	Cash Severance ($)(1)	Value of Accelerated Equity Awards ($)(2)
Without Cause	—	—
Change of Control (regardless of termination), Death or Disability	—	825,077
Retirement	—	48,825
Voluntary Termination	—	—

(1) If Mr. Williamson resigns or his employment is terminated for any reason, he may be paid for his unused vacation days. Mr. Williamson is currently entitled to accrue up to 25 vacation days per year. The above table assumes that there is no earned but unpaid base salary as of the time of termination.

(2) As of December 31, 2019, Mr. Williamson held 89,430 unvested shares of restricted stock, unvested stock options to purchase 8,750 shares of Common Stock and 95,435 unvested cash-settled stock appreciation rights. The value of accelerated unvested options was calculated by multiplying 8,750 shares underlying Mr. Williamson's unvested options by $8.68 (the closing price per share on December 31, 2019) and then deducting the aggregate exercise price for those shares (equal to $3.10 per share for those 8,750 options). The value of the restricted stock that would accelerate and fully vest in the event of a Change in Control, death or disability was calculated by multiplying 89,430 shares by $8.68. Stock appreciation rights having an exercise price greater than $8.68 per share were calculated as having a zero value.

R. Brian Hanson

R. Brian Hanson informed the Company of his retirement and resignation from the Board of Directors of the Company and his position as President and Chief Executive Officer, each effective June 1, 2019.

In connection with Mr. Hanson's retirement, the Company and Mr. Hanson negotiated and entered into a Separation Agreement dated as of June 3, 2019 (the "Separation Agreement"). The Separation Agreement, which contains a general release of claims in favor of the Company and provides that Mr. Hanson will receive, among other things, in each case subject to applicable withholdings (i) a severance payment equal to $2,400,000, payable in substantially equal installments in accordance with the Company's normal payroll practices over the two year period beginning June 1, 2019, provided that the first six months of payments shall be paid in a lump sum on the six-month anniversary of the Separation Agreement, (ii) a one-time payment of $250,000 representing the pro-rata share of Mr. Hanson's 2019 target annual bonus payment, and (iii) continuing coverage for a 48-month period under the Company's group medical, dental, health, and hospital plan for Mr. Hanson and his spouse and dependents.

In addition, the Company caused 120,000 shares of restricted Common Stock to become fully vested pursuant to the Restricted Stock Agreement dated December 1, 2018 between the Company and Mr. Hanson. The Company also caused the options for 25,000 shares of Common Stock to become fully vested under the terms of that certain Grant Agreement for Non-Statutory Option dated March 1, 2016. The exercise period for all outstanding vested stock options and appreciation rights was extended until the earlier of June 1, 2021 or the expiration of the full original term specified in each applicable stock option or stock appreciation rights agreement.

The full text of Mr. Hanson's Separation Agreement was filed on a Current Report on Form 8-K on June 4, 2019.

2019 PENSION BENEFITS AND NONQUALIFIED DEFERRED COMPENSATION

None of our named executive officers participates or has account balances in (i) any qualified or non-qualified defined benefit plans or (ii) any non-qualified defined contribution plans or other deferred compensation plans maintained by us.

EQUITY COMPENSATION PLAN INFORMATION
(as of December 31, 2019)

The following table provides certain information regarding our equity compensation plans under which equity securities are authorized for issuance, categorized by (i) the equity compensation plans previously approved by our shareholders and (ii) the equity compensation plans not previously approved by our shareholders:

Plan Category	Number of Securities to be Issued Upon Exercise of Outstanding Options, Warrants and Rights (a)	Weighted-Average Exercise Price of Outstanding Options, Warrants and Rights (b)	Number of Securities Remaining Available for Future Issuance Under Equity Compensation Plans (Excluding Securities Reflected in Column (a)) (c)
Equity Compensation Plans Approved by Shareholders			
2004 Long-Term Incentive Plan ("2004 LTIP")	244,692	$79.90	—
Third Amended and Restated 2013 Long-Term Incentive Plan ("2018 LTIP")	444,517	$14.59	736,618
2010 Employee Stock Purchase Plan ("2010 ESPP")	—	—	47,241
Subtotal	689,209		783,859
Equity Compensation Plans Not Approved by Shareholders			
	—	—	—
Subtotal	—		—
Total	689,209		783,859

A description of our Stock Appreciation Rights Plans has not been provided in this sub-section because awards of SARs made under those plans may be settled only in cash.

CEO PAY RATIO DISCLOSURE

As required by Item 402(u) of Regulation S-K, we are providing the following information about the relationship of the median of the annual total compensation of our employees and the annual total compensation of Mr. Christopher T. Usher, our Chief Executive Officer (our "CEO"):

For 2019, our last completed fiscal year:

- the median of the annual total compensation of all employees of our company (other than our CEO), was $95,487; and
- the annual total compensation of our CEO was $1,494,851.

Based on this information, for 2019, the ratio of the annual total compensation of Mr. Christopher T. Usher, our Chief Executive Officer, to the median of the annual total compensation of all employees was 16 to 1. Our CEO base pay and bonus has been annualized to reflect Mr. Usher's appointment as CEO on June 1, 2019. We expect that our pay ratio will increase for next year as Mr. Usher's full compensation and other benefits will be reflected in total.

The "median employee" that was used for purposes of calculating the ratio of the annual total compensation of our CEO to the median of the annual total compensation of all employees is the same employee that was identified for purposes of our 2018 disclosure. There has been no change in our employee population or employee compensation arrangements since that median employee was identified that we believe would significantly impact our pay ratio disclosure.

ITEM 2—ADVISORY (NON-BINDING) VOTE TO APPROVE EXECUTIVE COMPENSATION

As required by Section 14A of the Exchange Act, we are asking our shareholders to approve, on an advisory basis, the compensation of our named executive officers as we have described it in the "Executive Compensation" section of this Proxy Statement. This advisory vote is sometimes referred to as "Say on Pay." While this vote is not binding on our Company, management and the Compensation Committee will review the voting results for purposes of obtaining information regarding investor sentiment about our executive compensation philosophy, policies and practices. If there are a significant number of negative votes, we will seek to understand the concerns that influenced the negative votes, and consider them in making decisions about our executive compensation programs in the future. At our 2019 Annual Meeting, our shareholders approved our non-binding advisory vote to approve the compensation of our named executive officers, with approximately 99% of the votes cast on the proposal voting in favor of its approval.

We believe that the information we have provided within the Executive Compensation section of this Proxy Statement demonstrates that our executive compensation program is designed appropriately and is working to ensure management's interests are aligned with our shareholders' interests to support long-term value creation. As described above in detail under "*—Compensation Discussion and Analysis*," our compensation program reflects a balance of short-term incentives (including performance-based cash bonus awards), long-term incentives (including equity awards that vest over up to four years), and protective measures, such as clawback and anti-hedging policies and stock ownership guidelines, that are designed to support our long-term business strategies and drive creation of shareholder value. We believe that our program is (i) aligned with the competitive market for talent, (ii) sensitive to our financial performance and (iii) oriented to long-term incentives, in order to maintain and improve our long-term profitability. We believe our program delivers reasonable pay that is strongly linked to our performance over time relative to peer companies and rewards sustained performance that is aligned with long-term shareholder interests. Our executive compensation program is also designed to attract and to retain highly-talented executive officers who are critical to the successful implementation of our Company's strategic business plan.

We routinely evaluate the individual elements of our compensation program in light of market conditions and governance requirements and make changes as appropriate for our business. For example, in 2009 and in 2015 we reduced base salaries for most company employees, with the largest reductions borne by our executives, including our named executive officers. In addition, our employment contract with our Chief Executive Officer does not contain tax gross-ups or single trigger change of control provisions. We are continuously seeking to improve our executive compensation programs and align our programs with shareholder interests. We believe that our executive compensation program continues to drive and promote superior financial performance for our Company and our shareholders over the long term through a variety of business conditions.

We have regularly sought approval from our shareholders regarding portions of our compensation program that we have used to motivate, retain and reward our executives. Since 2000, our shareholders have voted on and approved our equity compensation plans (and amendments to those plans) fourteen times, in addition to approving our overall executive compensation program for each of the last eight years. Those incentive plans make up a significant portion of the overall compensation that we provide to our executives. Over the years, we have made numerous changes to our executive compensation program in response to shareholder input. Because the vote is advisory, however, it will not be binding upon our Board or the Compensation Committee, and neither our Board nor the Compensation Committee will be required to take any action as a result of the outcome of the vote on this proposal. The Compensation Committee will carefully evaluate the outcome of the vote when considering future executive compensation arrangements. After our Annual Meeting in May 2020, our next say-on-pay vote will occur at our next Annual Meeting scheduled to be held in May 2021.

Accordingly, our Board strongly endorses the Company's executive compensation program and recommends that shareholders vote in favor of the following advisory resolution:

RESOLVED, that the shareholders approve the compensation paid to the named executive officers of the Company, pursuant to the compensation disclosure rules of the Securities and Exchange Commission, including the compensation discussion and analysis, the compensation tables and any related material disclosed in the Company's Proxy Statement for the 2020 Annual Meeting of Shareholders.

We encourage our shareholders to review closely the Compensation Discussion and Analysis, the accompanying compensation tables and the related narrative disclosure before voting on this proposal. The Compensation Discussion and Analysis describes and explains our executive compensation policies and practices and the process that was used by the Compensation Committee of our Board to reach its decisions on the compensation of our named executive officers for 2019. It also contains a discussion and analysis of each of the primary components of our executive compensation program—base salary, annual cash incentive awards and long-term incentive awards—and the various post-employment arrangements that we have entered into with certain of our named executive officers.

The Board recommends that shareholders vote "FOR" the advisory (non-binding) vote to approve the compensation of our named executive officers, as described in this Proxy Statement.

ITEM 3—RATIFICATION OF APPOINTMENT OF INDEPENDENT AUDITORS

We have appointed Grant Thornton LLP (“Grant Thornton”) as our independent registered public accounting firm (independent auditors) for the fiscal year ending December 31, 2020. Grant Thornton served as our independent auditors for 2019.

The Board recommends that shareholders vote “FOR” ratification of the appointment of Grant Thornton as our independent auditors for 2020.

In the event shareholders do not ratify the appointment, the appointment will be reconsidered by the Audit Committee. Regardless of the outcome of the vote, however, the Audit Committee at all times has the authority within its discretion to recommend and approve any appointment, retention or dismissal of our independent auditors.

REPORT OF THE AUDIT COMMITTEE

The following Report of the Audit Committee does not constitute soliciting material and shall not be deemed filed or incorporated by reference into any other filings under the Securities Act or the Exchange Act, except to the extent ION specifically incorporates this Report by reference therein.

ION's management is responsible for ION's internal controls, financial reporting process, compliance with laws, regulations and ethical business standards and the preparation of consolidated financial statements in accordance with accounting principles generally accepted in the United States. ION's independent registered public accounting firm is responsible for performing an independent audit of ION's financial statements in accordance with generally accepted auditing standards and the effectiveness of ION's internal control over financial reporting, and issuing an opinion thereon. The Board of ION appointed the undersigned directors as members of the Audit Committee and adopted a written charter setting forth the procedures and responsibilities of the Audit Committee. Each year the Audit Committee reviews its Charter and reports to the Board on its adequacy in light of applicable rules of the NYSE. In addition, each year ION furnishes a written affirmation to the NYSE relating to Audit Committee membership, the independence and financial management expertise of the Audit Committee and the adequacy of the Charter of the Audit Committee.

The Charter of the Audit Committee specifies that the primary purpose of the Audit Committee is to assist the Board in its oversight of: (1) the integrity of the financial statements of ION; (2) compliance by ION with legal and regulatory requirements; (3) the independence, qualifications and performance of ION's independent registered public accountants; and (4) the performance of ION's internal auditors and internal audit function. In carrying out these responsibilities during 2019, and early in 2020 in preparation for the filing with the SEC of ION's Annual Report on Form 10-K for the year ended December 31, 2019, the Audit Committee, among other things:

- reviewed and discussed the audited financial statements with management and ION's independent registered public accounting firm;
- reviewed the overall scope and plans for the audit and the results of the examinations of ION's independent registered public accounting firm;
- met with ION management periodically to consider the adequacy of ION's internal control over financial reporting and the quality of its financial reporting and discussed these matters with its independent registered public accounting firm and with appropriate ION financial personnel and internal auditors;
- discussed with ION's senior management, independent registered public accounting firm and internal auditors the process used for ION's Chief Executive Officer and Chief Financial Officer to make the certifications required by the SEC and the Sarbanes-Oxley Act of 2002 in connection with the Form 10-K and other periodic filings with the SEC;
- reviewed and discussed with ION's independent registered public accounting firm (1) their judgments as to the quality (and not just the acceptability) of ION's accounting policies, (2) the written disclosures and the letter from the independent registered public accounting firm required by applicable requirements of the Public Company Accounting Oversight Board regarding such firm's communication with the Audit Committee concerning independence, and the independence of the independent registered public accounting firm, and (3) the matters required to be discussed with the Audit Committee under auditing standards generally accepted in the United States, including the matters required by Statement of Public Company Accounting Oversight Board ("PCAOB") AS No. 1301, "Communications with Audit Committees";

- based on these reviews and discussions, as well as private discussions with ION's independent registered public accounting firm and internal auditors, recommended to the Board the inclusion of the audited financial statements of ION and its subsidiaries in the 2019 Form 10-K for filing with the SEC;
- recommended the selection of Grant Thornton LLP as ION's independent registered public accounting firm for the fiscal year ending December 31, 2020; and
- determined that the non-audit services provided to ION by its independent registered public accounting firm (discussed below under "*—Principal Auditor Fees and Services*") are compatible with maintaining the independence of the independent auditors.

The Audit Committee met five times during 2019. The Audit Committee schedules its meetings with a view to ensuring that it devotes appropriate attention to all of its tasks. The Audit Committee's meetings include, whenever appropriate, executive sessions with ION's independent registered public accountants and with ION's internal auditors, in each case without the presence of ION's management. The Audit Committee has also established procedures for (a) the receipt, retention and treatment of complaints received by ION regarding accounting, internal accounting controls or auditing matters and (b) the confidential, anonymous submission by ION's employees of concerns regarding questionable accounting or auditing matters. However, this oversight does not provide the Audit Committee with an independent basis to determine that management has maintained appropriate accounting and financial reporting principles or policies, or appropriate internal controls and procedures designed to assure compliance with accounting standards and applicable laws and regulations. Furthermore, the Audit Committee's consideration and discussions with management and the independent registered public accounting firm do not assure that ION's financial statements are presented in accordance with generally accepted accounting principles or that the audit of ION's financial statements has been carried out in accordance with generally accepted auditing standards.

S. James Nelson, Jr., Chairman
James M. Lapeyre, Jr.
Tina Wininger

PRINCIPAL AUDITOR FEES AND SERVICES

In connection with the audit of the 2019 financial statements, we entered into an engagement agreement with Grant Thornton that sets forth the terms by which Grant Thornton would perform audit services for our Company. The following table shows the fees billed to us or accrued by us for the audit and other services provided by Grant Thornton for 2019 and 2018:

Fees	2019	2018
Audit Fees(a)	$1,246,280	$1,345,966
All Other Fees	—	—
Total	$1,246,280	$1,345,966

(a) Audit fees consist primarily of the audit and quarterly reviews of the consolidated financial statements, the audit of the effectiveness of internal control over financial reporting, audits of subsidiaries, statutory audits of subsidiaries required by governmental or regulatory bodies, attestation services required by statute or regulation, comfort letters, consents, assistance with and review of documents filed with the SEC, work performed by tax professionals in connection with the audit and quarterly reviews, and accounting and financial reporting consultations and research work necessary to comply with generally accepted auditing standards.

Our Audit Committee Charter provides that all audit services and non-audit services must be approved by the Audit Committee or a member of the Audit Committee. The Audit Committee has delegated to the Chairman of the committee the authority to pre-approve audit, audit-related and non-audit services not prohibited by law to be performed by our independent auditors and associated fees, so long as (i) the estimate of such fees does not exceed $50,000, (ii) the Chairman reports any decisions to pre-approve those services and fees to the full Audit Committee at a future meeting and (iii) the term of any specific pre-approval given by the Chairman does not exceed 12 months from the date of pre-approval.

All non-audit services were reviewed with the Audit Committee or the Chairman, which concluded that the provision of such services by Grant Thornton, was compatible with the maintenance of such firm's independence in the conduct of its auditing functions.

Other Matters

A representative of Grant Thornton will be available at the Annual Meeting, will be afforded an opportunity to make a statement if he/she desires to do so and will be available to respond to appropriate questions.

This Proxy Statement has been approved by the Board of Directors and is being made available to shareholders by its authority.

Matthew Powers
Executive Vice President, General Counsel
and Corporate Secretary

Houston, Texas
April 22, 2020

The 2019 Annual Report to Shareholders includes our financial statements for the fiscal year ended December 31, 2019. We have mailed a notice of the 2019 Annual Report to Shareholders and this Proxy Statement to all of our shareholders of record. The 2019 Annual Report to Shareholders does not form any part of the material for the solicitation of proxies.

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, 2019

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	Trading symbol(s)	Name of Each Exchange on Which Registered
Common Stock, $0.01 par value	IO	New York Stock Exchange

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 every Interactive Data File required to be submitted 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 such files). Yes ☒ No ☐

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

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

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

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

As of June 30, 2019 (the last business day of the registrant's second quarter of fiscal 2019), the aggregate market value of the registrant's common stock held by non-affiliates of the registrant was $89.2 million based on the closing sale price per share ($8.05) on June 28, 2019 as reported on the New York Stock Exchange.

As of February 3, 2020, the number of shares of common stock, $0.01 par value, outstanding was 14,224,787 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 13, 2020, 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 an innovative, asset light global technology company that delivers powerful data-driven decision-making offerings to offshore energy, ports and defense industries. We are entering a fourth industrial revolution where technology is fundamentally changing how decisions are made. Decision-making is shifting from what was historically an art to a science. Data, analytics and digitalization provide a step-change opportunity to translate information into insights to enhance decisions, gain a competitive edge and deliver superior returns.

We have been a leading technology innovator for over 50 years. While the traditional focus of our cutting-edge technology has been on the exploration and production ("E&P") industry, we are now broadening and diversifying our business into relevant adjacent markets such as offshore logistics, ports and harbors, defense and marine robotics. Our offerings are focused on improving subsurface knowledge to enhance E&P decision-making and enhancing situational awareness to optimize offshore operations. We have approximately 600 patents and pending patent applications in various countries around the world.

The Company is publicly listed on the New York Stock Exchange under the ticker IO. ION is headquartered in Houston, Texas with regional offices around the world. The company has approximately 500 employees, about half of whom are in technical roles and a quarter have advanced degrees.

During the first quarter of 2019, we consolidated our operating segments from three into two, eliminating the separate presentation of our Ocean Bottom Integrated Technologies segment. This consolidation aligns with our asset light business model and evolved strategy to commercialize 4Sea ocean bottom technologies instead of operating a crew.

We provide our services and products through two business segments—E&P Technology & Services and Operations Optimization. In addition, we have a 49% ownership interest in our INOVA Geophysical Equipment Limited ("INOVA Geophysical," or "INOVA"), a joint venture with BGP Inc. ("BGP"), a subsidiary of China National Petroleum Corporation ("CNPC"). BGP owns the remaining 51% equity interest in INOVA.

Our E&P Technology & Services segment creates digital data assets and delivers services to help E&P companies improve decision-making, reduce risk and maximize value. Across the E&P lifecycle, our E&P offerings focus on driving customer decisions, such as which blocks to bid on and for how much, how to maximize portfolio value, where to drill wells or how to optimize production.

Our Operations Optimization segment develops mission-critical subscription offerings and provides engineering services that enable operational control and optimization offshore. This segment is comprised of our Optimization Software & Services and Devices offerings. While we primarily sell to service providers, we began selling existing technology to new customers in E&P, ports and harbors, scientific, defense and academic industries.

We historically conducted our land seismic equipment business through INOVA, which manufactures land seismic data acquisition systems, digital sensors, vibroseis vehicles (i.e., vibrator trucks), and energy source controllers. We wrote our investment in INOVA down to zero in 2014.

Services and Products

E&P Technology & Services. Our offerings are designed to help E&P companies improve decision-making, reduce risk and maximize value. Within our E&P Technology and Services segment, there are three synergistic groups: Imaging Services, E&P Advisors and Ventures.

Our Imaging Services group provides advanced data processing and imaging services designed to maximize image quality and subsurface insights, helping E&P companies reduce exploration and production risk, evaluate and develop reservoirs, and increase production. Imaging Services continually develops and applies proprietary processing algorithms via its cutting-edge imaging engine to data owned or licensed by our customers to translate raw data into subsurface images. We continually enhance our novel workflows and invest in leading-edge infrastructure to efficiently deliver the best image quality.

While our Imaging Services group processes and images data for customers on a proprietary basis, the majority of these resources support our higher potential return multi-client business. The proprietary work we take on is complex, where our advanced technology is valued and where we closely collaborate with our customers to solve their toughest challenges, keeping our toolkit sharp. We maintain approximately 19 petabytes of digital seismic data storage in four global data centers, including a core data center located in Houston. 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 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's strategy is to provide technical, commercial and strategic advice across the exploration and production value chain, working at basin, prospect and field scales. E&P Advisors couples 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. In addition, the group drives value in our multi-client library by providing program assurance by understanding the technical, commercial, strategic and operational landscape to optimize our investments and seamlessly extends Imaging Services' workflows into the reservoir.

Our Ventures group leverages the world-class geoscience skills of both the Imaging Services and E&P Advisors groups to create global digital data assets that are licensed to multiple E&P companies to optimize their investment decisions. Our global data library consists of over 714,000 km of 2D and over 350,000 sq. km of 3D multi-client seismic data in virtually all major offshore petroleum provinces. Ventures provides services to manage multi-client or proprietary surveys, from survey planning and design to data acquisition and management, to final subsurface imaging and reservoir characterization. We focus on the technologically intensive components of the image development process, such as survey planning and design, and data processing and interpretation, while outsourcing asset-intensive components (such as field acquisition) to experienced contractors.

We offer our services to customers on both a proprietary and multi-client (non-exclusive) basis. In both cases, a majority of our exposure to survey costs are generally pre-funded by our customers. The period during which our multi-client surveys are being designed, acquired or processed is referred to as the "New Venture" phase. Once the New Venture phase is completed, they become part of our data library. For proprietary services, the customer has exclusive ownership of the data. For multi-client surveys, we generally retain ownership of or long-term exclusive marketing rights to the data and receive ongoing revenue from subsequent data license sales.

Operations Optimization. Our Operations Optimization segment develops mission-critical subscription offerings and provides engineering services that enable operational control and optimization offshore. Our advanced systems improve situational awareness, communication and risk management to enable rapid and informed decisions in challenging offshore environments. Our industry-leading mission management, navigation, communications and sensing technologies enable the operations of modern 3D towed streamer vessels.

This segment is comprised of our Optimization Software & Services and Devices offerings. While we primarily sell to oil and gas service providers, we began selling existing technology to new customers in E&P, ports and harbors, scientific, defense and academic industries. Service providers rely on our industry-leading marine imaging systems and services to acquire the highest quality data—safely and efficiently—in both towed streamer and seabed operations. Our integrated technology platforms combined with advanced prediction tools enable safer, more efficient operations.

We also leverage our core competencies to develop custom solutions. Our capabilities include data management, navigation, software development, acoustics, sensing, telemetry, fluid dynamics, positioning and control devices and electrical and mechanical engineering expertise.

Our Optimization Software & Services group provides survey design, command and control software systems and related services for marine towed streamer and seabed operations. Our software business commands recurring, premium subscription revenues. We are market leaders in our core business and adapted our platform to more broadly optimize operations. Our software offerings leverage a leading data integration platform to control and optimize operations. Engineering services experts deliver in-field optimization services, equipment maintenance and training to maximize value from our offerings.

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. Gator is our integrated navigation and data management system for multi-vessel ocean bottom services, electromagnetic and transition zone operations. 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 integrated with the operational plan.

Survey Planning and Design—We offer software and consulting services for planning and supervising complex surveys, including for 4D (time lapse) and wide-azimuth. Our acquisition expertise and MESA software platform enables clients, including both E&P companies and service providers, to optimize survey efficiency, data quality and costs.

Optimization Software—Marlin is a cloud-based software designed to maximize the safety and efficiency of complex offshore operations by automatically integrating a variety of data sources in real-time with operational plans to improve situational awareness and decision making. Akin to air traffic control systems, Marlin enables multiple stakeholders to share and visualize vessel route plans, foresee and avoid conflicts between vessels and fixed assets, optimize schedules safely within a rules-based environment, and measure and improve asset performance.

Our Devices group develops intelligent equipment controlled by our software to optimize operations. Our Devices group develops, manufactures and repairs marine towed streamer and seabed data acquisition systems, sensors and compasses which have been deployed in marine robotics, defense, scientific, E&P and other commercial applications.

Marine Positioning Systems—Our marine towed 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.

Towed Streamer Data Acquisition System—DigiSTREAMER enables customers to acquire low noise, cost-effective data in an environmentally-friendly manner with solid cables.

Ocean Bottom Data Acquisition Technologies—Ocean bottom data acquisition provides higher resolution imaging typically used for development rather than exploration objectives because it provides more detailed reservoir characteristics to optimize production. ION's 4Sea ocean bottom system is designed to deliver a step change in economics, image quality, QHSE and final data delivery time, creating more value for the customers by providing information faster for critical decisions, such as determining drilling locations, fluid injections, etc. The system's transformational architecture enables a paradigm shift in performance by centralizing operational data to power analytics and optimize decision-making. While the technology components can be licensed separately, maximum value is derived from a complete system. The Company is offering 4Sea components more broadly to the growing number of OBS service providers under recurring revenue commercial strategies.

Marine Diverter—SailWing is an innovative foil-based marine diverter for smart and efficient source towing. SailWing consists of a series of foils over ropes strung between the head float and the first source station. The foil sizes and number are easily configurable to accommodate a wide variety of survey requirements.

Analog Geophones—Analog geophones are sensors 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.

INOVA Geophysical. INOVA manufactures land acquisition systems, including the G3i HD, Hawk and Quantum recording platforms, land source products, including the AHV-IV series, UNIVIB®, and UNIVIB 2 vibroseis vehicles, and source controllers and multicomponent sensors, including the VectorSeis digital 3C receivers.

ION History

Founded in 1968 as Input/Output ("I/O"), ION began as a provider of highly specialized seismic source synchronization equipment. In 1988, the company introduced its first land system, System One, capable of recording large volumes of data more quickly, which helped the industry shift from 2D to 3D data. ION became publicly traded on the NASDAQ exchange in 1991, and was listed on the New York Stock Exchange in 1994 using the trading symbol "IO". Throughout the 1990s and 2000s, ION experienced growth through a number of acquisitions. In 2002, the company's first BasinSPAN multi-client program was introduced, paving the way for a global data library. In September 2007, Input/Output officially changed its name to "ION" as part of a re-branding to better reflect the continuing evolution of the company from an equipment manufacturer to a broad-based, technology-focused seismic solutions provider.

E&P Subsurface Data Collection and Use

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 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 and to monitor production from existing wells.

Typically, an E&P company engages the services of a geophysical acquisition contractor to develop a seismic survey design, secure permits, 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, 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 of the subsurface and integrating the geophysical data with other geological and production information such as well logs or core information.

Seismic data is recorded when listening devices placed on the Earth's surface, 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 large vibroseis (vibrator) vehicles. In marine acquisition, the energy is provided by a series of source 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 micro electromechanical system 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 and economic decisions relating to infrastructure and reserves in place.

Markets and Customers

Our core E&P market is in recovery and we are diversifying our revenues in other markets to help mitigate the impact of oil and gas market cycles. Our primary customers are E&P companies to whom we market and offer services, primarily multi-client seismic data programs from our Ventures group, data processing and imaging services from our Imaging Services group, as well as consulting services from our E&P Advisors and Optimization Software & Services group. In 2019, E&P companies accounted for approximately 73% of our total consolidated net revenues. Secondarily, 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.

We are actively diversifying our software and hardware into adjacent markets, primarily focused on ports and harbors and defense industries. Ports and harbors are undergoing a digital transformation that is fundamentally changing how they operate and increasing efficiency. Tier 1 ports have been leading the digital transformation, and there's an emerging need for Tier 2 ports to do so as well to compete. New disruptive technologies, such as artificial intelligence, Internet of Things and Blockchain have the potential to transform port efficiency.

The defense industry also benefits from enhanced situational awareness and advanced technologies for mission management and threat detection and mitigation. Using Marlin as the mission control and decision optimization tool in defense exercises, we were able to track hostile divers and unmanned underwater vehicles and manage real-time mitigation actions in response to operation zone incursions, such as smart nets, remote operated vehicle (“ROV”) interception and shepherding of friendly assets via unmanned service vehicles.

A significant portion 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 2019, 2018 and 2017, sales to destinations outside of North America accounted for approximately 73%, 75% and 76% 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 second half of our fiscal year.

For information concerning the geographic breakdown of our consolidated 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

The market for seismic services and products is highly competitive and characterized by frequent changes in technology.

Our Ventures group within our E&P Technology & Services segment faces competition in creating, developing and selling multi-client data libraries from a number of companies. CGG (an integrated geophysical company) and Schlumberger (a large integrated oilfield services company) shifted to an asset light strategy, joining TGS-NOPEC Geophysical Company ASA. Petroleum GeoServices ASA, Shearwater and Polarcus run acquisition crews and also compete in multi-client data acquisition. BGP operates in this space by primarily partnering with the aforementioned competitors to develop and sell multi-client data.

Our Imaging Services group within our E&P Technology & Services segment competes with 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 where our efforts are focused—are significantly higher. At the higher end of this market, CGG and Schlumberger are our two primary competitors for advanced imaging services. Both of these companies are significantly larger than ION in terms of revenue, processing locations and sales, marketing and financial resources.

Our principal competitor for marine 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. We also compete with other 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 service providers design and manufacture acquisition technology in-house (or through a network of third-party vendors) to differentiate themselves. Although this technology competes directly with ours, it is not usually made available to other seismic acquisition contractors.

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 competing land equipment suppliers.

Outside of our core market, we compete with a number of software and hardware technology companies. The market for ports and harbors and defense technologies tends to be very fragmented and with a range of huge multi-billion dollar competitors to new startups. The closest competitor to Marlin in ports and harbors is PortMaster, software developed by the Port of Rotterdam.

Our Strategy

The key elements of our business strategy are to:

- ***Leverage our technologies to create value through data capture, analysis and optimization to enhance companies' critical decision-making abilities and returns.*** Data, analytics and digitalization provide a step-change opportunity to translate information into insights to enhance decisions, gain a competitive edge and deliver superior returns. As a result, decision-making is shifting from what was historically an art to a science. ION offerings are focused on improving E&P decision-making and optimizing offshore operations.
- ***Expand our E&P Technology & Services business, focusing on delivering value closer to the reservoir.*** Over the last 5 years, we have made an effort to diversify our offerings within the E&P life cycle and move closer to the reservoir. Historically known for our 2D programs, we entered the 3D multi-client market in 2014 by acquiring and processing our first survey offshore Ireland. Since then, we have expanded our 3D seismic data library considerably by purchasing existing seismic data and reimaging the data using our advanced data processing techniques and algorithms, such as our new Full Waveform Inversion ("FWI"). For the foreseeable future, we expect to continue investing in research and development and computing infrastructure for our data processing business and to support our multi-client projects. We believe shifting to more reservoir-focused E&P offerings will increase earnings and position our company better for E&P cycles.
- ***Expand our Operations Optimization business into relevant adjacent markets.*** While our traditional focus for technology has been on the E&P industry, we are broadening and diversifying our software and equipment businesses into relevant adjacent markets such as offshore logistics, defense and marine robotics. Adjacent markets broaden our opportunity to better monetize our return on technology investments while reducing our susceptibility to E&P cycles. We intend to derive a significant portion of revenues from these non-E&P markets over the next 5 years.
- ***Continue investing in advanced software and equipment technology to provide next generation services and products.*** Our industry is competitive and continually evolving, so we intend to continue investing in the development of new technologies to stay on the cutting-edge of innovation. A key element of our business strategy has been to understand the challenges faced in survey planning, data acquisition, processing, and interpretation and offshore operations. We will continue to develop and offer technology and services that enable us to work with clients to solve their unique challenges around the world. In particular, we intend to focus on the development of our 4Sea next generation ocean bottom seismic ("OBS") technology, our Marlin operations optimization software, and continued advancement of our data processing and imaging workflows, such as FWI, with the goal of obtaining technical and market leadership in what we continue to believe are important and expanding markets. In 2019, our total investment

in research and development and engineering was equal to approximately 11% of our total consolidated net revenues for the year.

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 develop and leverage cutting-edge technology platforms to improve decision-making and profitability.*** Our cutting-edge data management and analysis platforms help derive insights from data we acquire to improve E&P decision-making, enhance reservoir management and optimize offshore operations. The data can be used to decide whether and how much to bid on a block, how to maximize production from a field, or how to optimize the safety and efficiency of complex maritime projects. Our operations optimization platform and imaging engine are the core underlying technology and we continually advance our complex algorithms to improve the resulting analysis.
- ***We focus on higher potential return offerings and creative business models to maximize shareholder value.*** We streamlined our business and focused on the areas with the highest potential returns because we believe every dollar invested should go further. In addition, we try to structure both the project financing and payment in a way to maximize profit, such as sharing in the success of a project.
- ***Our "asset light" strategy enables us to avoid significant fixed costs and remain financially flexible.*** We do not own a fleet of marine vessels and do not provide our own crews to acquire seismic data. We outsource seismic data acquisition activity to third parties that operate fleets of seismic vessels and equipment. This practice 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 scale up or down our capital investments based on E&P spending levels. We actively manage the costs of developing our multi-client data library business by having our customers 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 diversified portfolio approach enable us to offset regional downturns or local slowdowns.*** Conducting business around the world has been and will continue to be a key component of our strategy. This global focus and diversified portfolio approach has been helpful in minimizing the impact of any regional or country-specific slowdown for short or extended periods of time. While the traditional focus of our cutting-edge technology has been on the E&P industry, we are now broadening and diversifying our business into relevant adjacent markets such as offshore logistics, defense and marine robotics. Adjacent markets broaden our opportunity to better monetize our return on technology investments while reducing our susceptibility to E&P cycles.
- ***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"). Whereas almost all of our revenues in the early 2000s were derived principally from seismic service providers, in 2019, E&P companies accounted for approximately 73% of our total consolidated net revenues.

Product Research and Development

Our ability to compete effectively depends principally upon continued innovation in our underlying technologies and the value we can provide to inform decisions. As such, the overall focus of our research and development efforts has remained on improving the quality and value of the data we provide and the subsurface images we generate. In particular, we have concentrated on enhancing the quality of the information that can be extracted from the subsurface images. Research and development efforts targeted a range of new technologies.

The Imaging Services group continued to enhance its high-end workflows, such as FWI, and invest in infrastructure to efficiently deliver Tier 1 image quality.

The Optimization Software & Services group continues enhancing core survey design and command and control software while broadening Marlin's capabilities for adjacent markets, primarily for ports and harbors.

In 2019, development within Devices group was focused on the new in-water control device, SailWing, including sea trials and integration with Orca and Gator software, as well as further development of our successful towed streamer positioning products, including the automated Streamer Recovery Device and rechargeable battery option. We continue to invest in the development of new sensors applicable within and outside our core business. In 2020, development will be primarily focused on new technologies for adjacent markets and sustaining our existing portfolio of technologies.

As many of these new services and products are under development and, as the development cycles from initial conception 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.

Intellectual Property

We rely on a combination of patent, copyright and trademark laws, trade secrets, confidentiality procedures and contractual provisions to protect our proprietary technologies. We have approximately 600 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, including the potential for adverse decisions by judicial or administrative bodies in foreign countries with unpredictable or corrupt judicial systems. 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," "DigiFIN," "Hawk," "Orca," "G3i," "WiBand,","UNIVIB", "MESA," and "VectorSeis" refer to the VECTORSEIS®, DigiFIN®, HAWK®, ORCA®, G3I®, WiBand®, UNIVIB®, MESA®, and VectorSeis® registered marks owned by ION or INOVA Geophysical or their affiliates, and the terms "BasinSPAN," "DigiBIRD II," “Gator,” “AHV-IV,” “ResSCAN,” “SailWing,” “Marlin”, “SimSurvey” and “4Sea” refer to the BasinSPAN™, DigiBIRD II™, GATOR™, AHV-IV™, ResSCAN™, SailWing™, Marlin™, SimSurvey™, and 4Sea™ trademarks and service marks owned by ION or INOVA Geophysical or their affiliates.

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 (including the potential for adverse decisions by judicial or administrative bodies in foreign countries with unpredictable or corrupt judicial systems). We are required to consent to home country jurisdiction in many of our contracts with foreign state-owned companies, particularly those countries where our data are acquired.

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. 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, 2019, we had 519 regular, full-time employees, 295 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 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 comparable 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 financial results and liquidity;
- 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;
- 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 laws or regulations pertaining to the oil and gas industry, including trade restrictions, embargoes and sanctions imposed by the U.S. government;
- future government actions that may result in the deprivation of our contractual rights, including the potential for adverse decisions by judicial or administrative bodies in foreign countries with unpredictable or corrupt judicial systems.
- expected net revenues, income from operations and net income;
- expected gross margins for our services and products;
- 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;
- expectations regarding the impact of the U.S. Tax Cuts and Jobs Act;
- 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 L.L.C. ("WesternGeco") filed a lawsuit against us in the United States District Court for the Southern District of Texas (the "District Court"). In the lawsuit, styled WesternGeco L.L.C. v. ION Geophysical Corporation, WesternGeco alleged that we infringed four of their patents concerning marine seismic surveys.

Trial began in July 2012, and the jury returned a verdict in August 2012. The jury found that we infringed on six "claims" contained in four of WesternGeco's patents by supplying our DigiFIN lateral streamer control units from the United States. (In patent law, a "claim" is a technical legal term; an infringer infringes on one or more "claims" of a given patent.)

In May 2014, the District Court entered a Final Judgment against us in the amount of $123.8 million. The Final Judgment also enjoined us from supplying DigiFINs or any parts unique to DigiFINs in or from the United States. We conducted our business in compliance with the District Court's orders, and have reorganized our operations such that we no longer supply DigiFINs or any parts unique to DigiFINs in or from the United States.

As of 2018, we paid WesternGeco the $25.8 million of the Final Judgment (the portion of the judgment representing reasonable royalty damages and enhanced damages, plus interest).

However, as further described below, the balance of the judgment against us ($98.0 million, representing lost profits from surveys performed by our customers outside of the United States, plus interest) has been vacated, and a new trial ordered, to determine what lost profit damages, if any, WesternGeco is entitled to.

The Final Judgment was vacated after it was appealed to the United States Court of Appeals for the Federal Circuit in Washington, D.C. (the "Court of Appeals"), then to the Supreme Court of the United States, which remanded the case, again, to the Court of Appeals.

On January 11, 2019, the Court of Appeals refused to disturb the award of reasonable royalties to WesternGeco (which the Company paid in 2016), but did not reinstate the lost profits award; rather, the Court of Appeals remanded the case back to the District Court to determine whether to hold a new trial as to lost profits.

On August 30, 2019, the District Court refused WesternGeco's request to reinstate the lost profits awards against us, and instead ordered a new trial to determine what lost profits, if any, WesternGeco is entitled to from surveys performed by our customers outside of the United States.

The District Court's basis for granting the new trial as to lost profits was that, subsequent to the jury verdict that awarded lost profits, the Patent Trial and Appeal Board ("PTAB") of the Patent and Trademark Office, in an administrative proceeding, invalidated four of the five patent claims that formed the basis for the lost profits judgment against us (that is, the PTAB held that those four patent claims should never have been granted), and the Court of Appeals and the Supreme Court both subsequently refused to overturn that finding. A trial date for the new trial has not yet been set.

We may not ultimately prevail in the litigation and we could be required to pay lost profits if and when a new judgment issues in the new trial. Our assessment that we do not have a loss contingency may change in the future due to developments at the District Court, and other events, such as changes in applicable law, and such reassessment could lead to the determination that a significant loss contingency is probable, which could have a material adverse effect on our business, financial condition and results of operations.

Our business depends on the level of exploration and production activities by the oil and natural gas industry. If capital expenditures by E&P companies decline, typically because of lower price realizations for oil and natural gas, the 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. 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;
- public health crises, such as the coronavirus outbreak at the beginning of 2020;
- changes in government leadership;
- 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 OPEC and non-OPEC members, such as Russia, with 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 as we are subject to cyclicality 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 and production of oil and natural gas and, in the case of new seismic data acquisition, the willingness of those companies to forgo ownership of 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.

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, the product and service mix of our revenues, the seasonality of our business (with strongest demand typically in the second half of the year) and delays caused by factors beyond our control. Because some of our products are technologically complex and tend to be relatively large investments, we generally experience long sales cycles for these types of products with a series of technical and commercial reviews by our customers and historically incur significant expense at the beginning of these cycles. Our revenues and gross margin can vary widely from period to period due to changes in customer requirements and demand as well as timing of orders and shipments and 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. 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.

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

At December 31, 2019, our total outstanding indebtedness was approximately $121.5 million, consisting of approximately $120.6 million outstanding Senior Secured Second-Priority Notes ("Second Lien Notes"), $1.9 million of equipment finance lease obligations and $1.0 million of other short-term debt, partially offset by $2.0 million of debt issuance costs. At December 31, 2019, there was no outstanding indebtedness under our Credit Facility. Under our Credit Facility, the lender has committed $50.0 million of revolving credit, subject to a borrowing base. At December 31, 2019, we had $39.3 million of borrowing base 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. See Item 7. *"Management's Discussion and Analysis of Financial Condition and Results of Operations."*

In February 2019, S&P Global Ratings ("S&P") maintained our corporate credit rating of CCC+ and revised their outlook from a negative to stable. S&P's outlook revision reflects our improved liquidity and expected improving financial measures due to an expected increase in international capital spending. Following the redemption of our Third Lien Notes in March 2018, Moody's Investors Service has withdrawn all assigned public credit ratings on our Company, including the Caa2 Corporate Family Rating.

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.

If we are unable to raise additional working capital, we will be unable to fully fund our operations and to otherwise execute our strategic objectives.

At December 31, 2019, we had a negative working capital of $23.6 million. Should our costs and expenses prove to be greater than we currently anticipate, or should we change our current operating plan in a manner that will increase or accelerate our anticipated costs and expenses, the depletion of our working capital would be accelerated. In addition, if we do not generate sufficient revenues to cover our working capital requirements, our operations could be severely affected. To the extent it becomes necessary to raise additional cash in the future as s result of current cash and working capital resources being depleted, we would draw on our credit facility, of which $39.3 million was available to borrow at December 31, 2019. We may also seek to raise additional working capital through the public or private sale of assets, issuance of debt or equity securities and debt financing or short-term loans, or a combination of the foregoing. There is no assurance that we will be able to secure the additional cash or working capital we may require to continue our operations and to fully implement our operating plan.

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.

The indentures governing the 9.125% Second Lien Notes due 2021 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 Second Lien Notes imposes, (and the terms of any future indebtedness could 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 Second Lien 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 Second Lien Notes. If an event of default occurs, the trustee and holders of the Second Lien 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 Second Lien Notes would also constitute an event of default under our Credit Facility. In addition, if we are unable to repay or extend the maturity of our Second Lien Notes prior to their scheduled maturity in December 2021, the maturity of our Credit Facility, which currently matures in August 2023, will accelerate to mature in October 2021 which may cause us to face substantial liquidity problems and may force us to reduce or delay investments, dispose of material assets or operations, or issue additional debt or equity. See Footnote 5 "*Long-term Debt*" 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 that are sometimes operated in dangerous marine environments.

We make strategic decisions from time to time as to the technologies in which we invest. 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 services. 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.

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.

The businesses of our E&P Technology & Services segment and Optimization Software & Services group within our 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. 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.

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 also face exposure to product liability claims in the event that certain of our products, or certain components manufactured by others that are incorporated into our products, fail to perform to specification, which failure results, or is alleged to result, in property damage, bodily injury and/or death. Marine exploration in particular can present dangerous conditions to those conducting it. Any product liability claims decided adversely against us may have a material adverse effect on our results of operations and cash flows. While we maintain insurance coverage with respect to certain product liability claims, we may not be able to obtain such insurance on acceptable terms in the future, if at all, and any such insurance may not provide adequate coverage against product liability claims. In addition, product liability claims can be expensive to defend and can divert the attention of management and other personnel for significant periods of time, regardless of the ultimate outcome. Furthermore, even if we are successful in defending against a claim relating to our products, claims of this nature could cause our customers to lose confidence in our products and us.

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 2019, we invested approximately $28.8 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 customers. 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 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 73%, 75% and 76% of our consolidated net revenues for 2019, 2018 and 2017, respectively. We believe that export sales will remain a significant percentage of our revenues. 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, India, Asia Pacific and Russia, that are subject to risks of war, political disruption, civil disturbance, political corruption, public health crises, 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;
- 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, including the potential for adverse decisions by judicial or administrative bodies in foreign countries with unpredictable or corrupt judicial systems.

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 ours 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, products and adjacent markets, our revenues may suffer.

Services and products for our business are characterized by rapid technological advances and innovation 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 and diversification to new markets are delays in development or manufacturing, variations in costs, customer acceptance, delays in customer purchases, reductions in price or replacing sales of existing products in anticipation of new offerings, write-offs or write-downs of the carrying costs of materials associated with prior generation products, difficulty in predicting customer demand due to competition, risks associated with customer qualification, evaluation of new products, quality issues or other defects that may not be adequately supported by application software and untimely commercialization. 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. If any of these risks materializes or if we do not make an effective transition, our revenues and 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. In 2019, we had one multinational oil customer with sales that exceeded 10% of our consolidated net revenues. In 2018, we had two customers with sales that each exceeded 10% of our consolidated net revenues and we had one customer with sales that exceeded 10% of our consolidated net revenues for 2017. Our top five customers together accounted for approximately 40%, 39% and 34% of our consolidated net revenues during 2019, 2018 and 2017. 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.

Any consolidation or strategic change made by our customers may impact the demand for our services and products. The loss of any of our significant customers 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 liquidity may adversely affect our financial results.

Our stock price has been volatile, declining and increasing from time to time.

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 (such as changes in interest rates, commodity and equity prices and the value of financial assets) 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:

- the inherent lumpiness and volatility of our customers' spending cycles;
- 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 changes in oil and gas supply and demand;

- the operating and securities price performance of companies that investors or analysts consider comparable to us;
- actions by rating agencies related to the Notes; and
- announcements of strategic developments, acquisitions and other material events by us or our competitors.

If the price of our common stock declines, our ability to raise funds through the issuance of equity or otherwise use our common stock as consideration will be reduced. 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. In addition, the volatility in the market price of our common stock affects the value of our stock appreciation rights (“SARs”). To the extent that the price of our common stock increases, the value of our SARs will increase and could have a negative impact on our earnings and cash flows.

Goodwill and other long-lived assets (multi-client data library and property, plant and equipment) that we have recorded are subject to impairment evaluations. In addition, our product 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.

Reductions in or an impairment of the value of our goodwill and other long-lived assets would 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, 2019, our remaining goodwill, multi-client data library and property, plant and equipment balances were $23.6 million, $60.4 million and $13.2 million, respectively. For 2019, we wrote down our multi-client data library by $9.1 million resulting from our annual impairment review. For 2018, we recognized an impairment of $36.6 million in property, plant and equipment for our cable-based ocean bottom acquisition technologies.

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.

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

We derived approximately 73% of our 2019 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. We operate in a wide variety of jurisdictions, including the United Kingdom, Brazil, Mexico, 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.

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 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 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 recently. Our growth has presented challenges to us to recruit, train and retain our employees while managing the impact of potential wage inflation and the lack of available qualified labor in some markets where we operate. 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.

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.

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. . We have multiple product lines and services that are sold in many countries throughout the world. Certain countries are subject to restrictions, 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. Violation of these rules could result in significant penalties. 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. 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.

Existing or future laws and regulations related to greenhouse gases and climate change could have a material adverse effect on our business, results of operations, and financial condition.

Changes in environmental requirements related to greenhouse gases and climate change may negatively impact demand for our services. For example, oil and natural gas exploration and production may decline as a result of environmental requirements. Local, state, and federal agencies have been evaluating climate-related legislation and other regulatory initiatives that would restrict emissions of greenhouse gases in areas in which we conduct business. Because our business depends on the level of activity in the oil and natural gas industry, existing or future laws and regulations related to greenhouse gases and climate change, including incentives to conserve energy or use alternative energy sources, could have a negative impact on our business if such laws or regulations reduce demand for oil and natural gas.

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. 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, disseminating of highly confidential information, 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, 2019 were as follows:

Operating Facilities	Square Footage	Segment
Houston, Texas	210,000	Global Headquarters and E&P Technology & Services
Harahan, Louisiana	144,000	Devices group within Operations Optimization
Chertsey, England	18,000	E&P Technology & Services
Edinburgh, Scotland	16,000	Optimization Software & Services group within Operations Optimization
	388,000	

Each of these operating facilities is leased by us under long-term lease agreements. These lease agreements have terms that expire ranging from 2020 to 2026. See Footnote 14 "*Lease Obligations*" of Footnotes to *Consolidated Financial Statements.*

In addition, we lease offices in Dubai, UAE; 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; and Rio de Janeiro, Brazil. 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 L.L.C. (“WesternGeco”) filed a lawsuit against us in the United States District Court for the Southern District of Texas (the “District Court”). In the lawsuit, styled WesternGeco L.L.C. v. ION Geophysical Corporation, WesternGeco alleged that we infringed four of their patents concerning marine seismic surveys.

Trial began in July 2012, and the jury returned a verdict in August 2012. The jury found that we infringed on six “claims” contained in four of WesternGeco’s patents by supplying our DigiFIN lateral streamer control units from the United States. (In patent law, a “claim” is a technical legal term; an infringer infringes on one or more “claims” of a given patent.)

In May 2014, the District Court entered a Final Judgment against us in the amount of $123.8 million. The Final Judgment also enjoined us from supplying DigiFINs or any parts unique to DigiFINs in or from the United States. We conducted our business in compliance with the District Court’s orders, and have reorganized our operations such that we no longer supply DigiFINs or any parts unique to DigiFINs in or from the United States.

As of 2018, we paid WesternGeco the $25.8 million of the Final Judgment (the portion of the judgment representing reasonable royalty damages and enhanced damages, plus interest).

However, as further described below, the balance of the judgment against us ($98.0 million, representing lost profits from surveys performed by our customers outside of the United States, plus interest) has been vacated, and a new trial ordered, to determine what lost profit damages, if any, WesternGeco is entitled to.

The Final Judgment was vacated after it was appealed to the United States Court of Appeals for the Federal Circuit in Washington, D.C. (the “Court of Appeals”), then to the Supreme Court of the United States, which remanded the case, again, to the Court of Appeals.

On January 11, 2019, the Court of Appeals refused to disturb the award of reasonable royalties to WesternGeco (which the Company paid in 2016), but did not reinstate the lost profits award; rather, the Court of Appeals remanded the case back to the District Court to determine whether to hold a new trial as to lost profits.

On August 30, 2019, the District Court refused WesternGeco’s request to reinstate the lost profits awards against us, and instead ordered a new trial to determine what lost profits, if any, WesternGeco is entitled to from surveys performed by our customers outside of the United States.

The District Court’s basis for granting the new trial as to lost profits was that, subsequent to the jury verdict that awarded lost profits, the Patent Trial and Appeal Board (“PTAB”) of the Patent and Trademark Office, in an administrative proceeding, invalidated four of the five patent claims that formed the basis for the lost profits judgment against us (that is, the PTAB held that those four patent claims should never have been granted), and the Court of Appeals and the Supreme Court both subsequently refused to overturn that finding. A trial date for the new trial has not yet been set.

We may not ultimately prevail in the litigation and we could be required to pay lost profits if and when a new judgment issues in the new trial. Our assessment that we do not have a loss contingency may change in the future due to developments at the District Court, and other events, such as changes in applicable law, and such reassessment could lead to the determination that a significant loss contingency is probable, which could have a material adverse effect on our business, financial condition and results of operations.

Other Litigation

In July 2018, we prevailed in an arbitration that we initiated against the Indian Directorate General of Hydrocarbons ("DGH") relating to our ability to continue to license data under our IndiaSPAN program. The DGH filed a lawsuit in court in India to vacate the arbitration award; in connection with that lawsuit, we were ordered to escrow approximately $4.5 million in sales proceeds that we had received in respect of sales from our IndiaSPAN program, pending the outcome of the DGH's challenge to the arbitration award. We challenged the escrow order, but on December 9, 2019, the Supreme Court of India ordered us to comply with it which will require us to deposit approximately $4.5 million in escrow in late February 2020. We prevailed on the merits in the arbitration and expect to have that award upheld in Indian court, which would result in release of our portion of the escrowed money.

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."

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.

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 Credit Facility) 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 Second Lien 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, 2019, there were 547 holders of record of our common stock.

During the three months ended December 31, 2019, in connection with the vesting of (or lapse of restrictions on) shares of our restricted stock held by certain employees, we acquired shares of our common stock in satisfaction of tax withholding obligations that were incurred on the vesting date. The date of acquisition, 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, 2019 to October 31, 2019	—	$ —	Not applicable	Not applicable
November 1, 2019 to November 30, 2019	—	$ —	Not applicable	Not applicable
December 1, 2019 to December 31, 2019	4,026	$8.43	Not applicable	Not applicable
Total	4,026	$8.43		

On November 30, 2018, the Company's stockholders approved certain amendments to the Company's Second Amended and Restated 2013 Long-term Incentive Plan (the "2013 LTIP") including increasing the total number of shares of common stock available for issuance under the 2013 LTIP by 1.2 million shares, for a total of approximately 1.7 million shares, eliminating the restriction on the number of shares in the 2013 LTIP that can be issued as full value awards and certain other technical updates and clarifications related to Section 162(m) of the internal revenue code, as amended.

On February 21, 2018, in connection with the Public Equity Offering (as described in Footnote 12 "*Stockholders' Equity and Stock-based Compensation"* of Footnotes to the *Consolidated Financial Statements*), we issued and sold 1,820,000 shares of common stock at a public offering price of $27.50 per share, and warrants to purchase an additional 1,820,000 shares of the Company's common stock. The net proceeds from this offering were $47.0 million, including transaction expenses. A portion of the net proceeds were used to retire the Company's $28.5 million Third Lien Notes in March 2018. The warrants have an exercise price of $33.60 per share, are immediately exercisable and were to expire on March 21, 2019. On February 4, 2019, the Company extended expiration of the warrants to March 21, 2020.

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 2019, 2018, 2017, 2016 and 2015, and with respect to our consolidated balance sheets at December 31, 2019, 2018, 2017, 2016 and 2015, have been derived from our audited consolidated financial statements.

Our results of operations and financial condition have been affected by restructuring activities, legal contingencies, dispositions, debt refinancing 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, 2015 - 2019 time period were impacted by the following items (before tax):

	Years Ended December 31,				
	2019	2018	2017	2016	2015
	(In thousands)				
Cost of sales:					
Write-down of multi-client data library	$(9,072)	$ —	$(2,304)	$ —	$ (399)
Operating expenses:					
Impairment of long-lived assets	$ —	$(36,553)	$ —	$ —	$ —
Stock appreciation right awards and related expense	$(2,910)	$ (2,105)	$(6,141)	$ —	$ —
Severance expense	$(2,810)	$ —	$ —	$ —	$ —
Other income (expense):					
Reversal of (accrual for) loss contingency related to legal proceedings	$ —	$ —	$(5,000)	$ 1,168	$101,978
Recovery of INOVA bad debts	$ —	$ —	$ 844	$ 3,983	$ —
Loss on bond exchange	$ —	$ —	$ —	$(2,182)	$ —

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.

Historical Selected Financial Data

	2019	2018	2017	2016	2015
	Years Ended December 31, (In thousands, except for per share data)				
Statement of Operations Data:					
Net revenues	$174,679	$180,045	$197,554	$172,808	$ 221,513
Gross profit	60,022	59,620	75,639	36,032	8,003
Loss from operations	(24,459)	(54,272)	(8,699)	(43,171)	(100,632)
Net loss applicable to common shares	(48,199)	(71,171)	(30,242)	(65,148)	(25,122)
Net loss per basic share	$ (3.41)	$ (5.20)	$ (2.55)	$ (5.71)	$ (2.29)
Net loss per diluted share	$ (3.41)	$ (5.20)	$ (2.55)	$ (5.71)	$ (2.29)
Weighted average number of common shares outstanding	14,131	13,692	11,876	11,400	10,957
Weighted average number of diluted shares outstanding	14,131	13,692	11,876	11,400	10,957
Balance Sheet Data (end of year):					
Working capital	$(23,561)[(a)]	$ 7,891	$ (8,628)[(b)]	$ 16,555	$ 93,160
Total assets	233,194	292,552	301,069	313,216	435,088
Long-term debt[(c)]	121,459	121,741	156,744	158,790	182,992
Total (deficit) equity	(34,632)	7,824	30,806	53,398	112,040
Other Data:					
Investment in multi-client data library	$ 28,804	$ 28,276	$ 23,710	$ 14,884	$ 45,558
Capital expenditures	2,411	1,514	1,063	1,488	19,241
Depreciation and amortization (other than multi-client data library)	3,657	8,763	16,592	21,975	26,527
Amortization of multi-client data library	39,541	48,988	47,102	33,335	35,784

(a) Working capital was impacted by project delays.

(b) Working capital at December 31, 2017 is negative due to $28.5 million of Third Lien Notes (redeemed March 26, 2018) being reclassified from long-term to current.

(c) Includes current maturities of long-term debt.

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 have been a leading technology innovator for over 50 years. While the traditional focus of our cutting-edge technology has been on the exploration and production ("E&P") industry, we are now broadening and diversifying our business into relevant adjacent markets such as offshore logistics, ports and harbors, defense and marine robotics.

Our offerings are focused on improving subsurface knowledge to enhance E&P decision-making and enhancing situational awareness to optimize offshore operations. We serve customers in most major energy producing regions of the world from strategically located offices.

The Company is publicly listed on the New York Stock Exchange under the ticker IO. ION is headquartered in Houston, Texas with regional offices around the world.

During the first quarter of 2019, we consolidated our operating segments from three into two, eliminating the separate presentation of our Ocean Bottom Integrated Technologies segment. This consolidation aligns with our asset light business model and evolved strategy to commercialize 4Sea ocean bottom technologies instead of operating a crew. Revenues from 4Sea are being recognized through the relevant segment, either E&P Technology & Services or Operations Optimization.

We provide our services and products through two business segments—E&P Technology & Services and Operations Optimization.

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 economic growth, resource supply and demand, and commodity prices. Oil and gas projections suggest continued demand growth may create a supply gap in the middle of the next decade that production from US shale developments may be unable to meet, necessitating offshore exploration and development. The annual decline rate in existing oil fields is about 10%, which can be reduced to about 5% per year with infill and other enhanced recovery techniques. Due to the time it takes to develop and start producing oil and gas from new discoveries offshore, there's an increasing need to reinvest in conventional resources offshore to meet demand in the middle of the next decade. We're starting to see increasing pressure for a resumption in offshore investment and exploration activity to replace reserves and existing production.

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

	Brent Crude (per bbl)		West Texas Intermediate Crude (per bbl)		Henry Hub Natural Gas (per mcf)	
Quarter ended	**High**	**Low**	**High**	**Low**	**High**	**Low**
12/31/2019	$69.70	$57.92	$61.76	$52.41	$2.87	$1.75
9/30/2019	$68.42	$55.03	$63.10	$51.14	$2.75	$2.02
6/30/2019	$74.94	$61.66	$66.24	$51.13	$2.76	$2.27
3/31/2019	$69.08	$53.23	$61.59	$46.31	$4.25	$2.54
12/31/2018	$86.07	$50.57	$76.40	$44.48	$4.70	$3.10
9/30/2018	$82.72	$68.38	$74.19	$65.07	$3.12	$2.73
6/30/2018	$80.42	$66.04	$77.41	$62.03	$3.08	$2.74
3/31/2018	$71.08	$61.94	$66.27	$59.20	$6.24	$2.49

Source: EIA.

Crude oil prices traded within relatively narrow price ranges in 2019. Brent prices reached an annual daily low of $55 per barrel in early January 2019 and a daily high of $75 per barrel in late April 2019, resulting in a range of $20 per barrel, the narrowest Brent price range since 2003. These narrower trading ranges occurred as a result of OPEC and others actively managing supply to offset upward and downward price pressures. The U.S. Energy Information Administration ("EIA") estimates that global oil markets were roughly balanced in 2019, as global oil supply declined slightly and global oil consumption grew at its slowest pace since 2011. In 2019, several factors provided downward pressure on crude oil prices including the growth in US production and lower global demand growth. These were offset by the September attacks on Saudi Arabia's crude oil processing facilities, OPEC and non-OPEC continued production cut and U.S sanctions on Venezuela and Iran. The EIA forecasts the Brent crude oil spot price will average $65 per barrel in 2020, which is relatively consistent with 2019.

Given the historical volatility of crude prices, there is a continued risk that if commodity prices start to deteriorate again, demand for our services and products could decline.

Impact to Our Business

Our portfolio of E&P offerings is aligned with market trends and targets all aspects of spending across the E&P life cycle. For example, current E&P focus areas include higher return infrastructure-led exploration, emerging basins, lower breakeven opportunities and targeted frontier basins.

In 2019, our total net revenues decreased by $5.3 million, or 3%, to $174.7 million for 2019 from $180.0 million for 2018. This decrease is primarily attributable to decline in our New Venture revenues resulting from the scale and timing of our multi-client programs.

Investments in our multi-client data library are dependent upon the timing of our new venture projects and the availability of underwriting by our customers. We continue to maintain high standards for underwriting new projects. Our asset light strategy enables us to scale our business to market conditions avoiding significant fixed costs and maintaining flexibility to manage the timing and amount of our capital expenditures.

In our E&P Technology & Services segment, our New Venture revenues decreased compared to 2018 due to scale and timing of our new programs. Delays in license round announcements can materially impact the timing of sales in areas where our New Venture programs are underway. Our Data Library sales increased in 2019 compared to 2018 due to sales of South American data. Imaging Services revenues increased due to modest market improvement and the successful execution of our strategy to focus on key clients, applications and basins that benefit from and enable us to continue enhancing our advanced technologies. We invested $28.8 million in our multi-client data library during 2019, approximately $0.5 million and $5.1 million more compared to 2018 and 2017, respectively.

At December 31, 2019, our E&P Technology & Services segment backlog, which consists of commitments for (i) data processing work, (ii) New Venture projects (both multi-client and proprietary) by our Ventures group underwritten by our customers and (iii) E&P Advisors projects, decreased 14% to $18.9 million, compared with $21.9 million at December 31, 2018. The majority of our backlog relates to our multi-client seismic programs and our proprietary Imaging Services and E&P Advisors work. We anticipate that the majority of our backlog will be recognized as revenue over the first half of 2020.

Over the last five years, we have made an effort to diversify our offerings across the E&P life cycle and move closer to the reservoir, where capital investment tends to be more consistent. Our Imaging Services team has largely worked in the high-end 3D market for the last decade. In the multi-client market, we were historically known for our 2D programs and entered the 3D market in 2014. Since then, we have rapidly expanded our 3D seismic data library by purchasing existing seismic data and reimaging the data using our advanced data processing techniques and algorithms. The 350,000 sq km of multi-client reimaging programs has given us credibility and experience in the space, leading to a pipeline of opportunities for new 3D towed streamer or seabed programs that offer larger scale revenue and profit potential.

Within the Operations Optimization segment, the increase in Optimization Software & Services revenues was due to an increase in deployments of and associated engineering services related to our Marlin offshore operations optimization software. Devices revenues increased due to an increase in sales of replacement marine equipment and repairs.

It is our view that technologies that add a competitive advantage through improved imaging, lower costs, higher productivity, or enhanced safety will continue to be valued in our marketplace. We believe that our newest technologies, such as Marlin and 4Sea, will continue to attract customer interest, because these technologies are designed to deliver those desirable attributes.

The sustained E&P shift to maintain capital discipline and deliver shareholder value has resulted in a leaner, more profitable environment. E&P management focus is now much more closely aligned with investor interests where emphasis is on value metrics such as return on investment and cash generation as opposed to volume metrics such as production or reserves growth.

International activity has been picking up while North America has slowed down. Sustainable structural changes have made offshore increasingly cost-competitive with shale, with improved payback timeframes. As a result, we are seeing investment start to flow offshore again, which aligns more favorably with ION's strategy and portfolio. In addition, exploration returns have rebounded back to healthier levels, with frontier areas demonstrating the most attractive returns, which will likely encourage future investment.

Historically, our revenue and EBITDA generation is lower in the first part of the year as customers tend to set budgets in the first quarter, then picks up as they firm up plans throughout the year. The last few years, E&P companies have remained focused on generating cash and shareholders return prioritizing value over volume.

We expect continued activity to rationalize and high grade portfolios to maximize return on investment, and related data sales opportunities to fill knowledge gaps. With a strong focus on value generation, exploration spending remains very focused on specific geographic areas.

As a result, we are focusing to align our organization structure with our strategy as well as rightsizing our costs relative to our revenues. We are cutting our costs by reducing our use of contractors and vendors and eliminating certain discretionary spending, reducing our facilities and reducing our headcount by approximately 11%. We expect that these efforts will result in annualized savings of over $20.0 million.

Key Financial Metrics

The tables below provide (i) a summary of our net revenues for our company as a whole, and by segment, for 2019, 2018 and 2017, and (ii) an overview of other certain key financial metrics for our company as a whole and our two business segments on a comparative basis for 2019, 2018 and 2017, as reported and as adjusted in all three years for the special items recorded for those years.

	Years Ended December 31,		
	2019	2018	2017
		(In thousands)	
Net revenues:			
E&P Technology & Services:			
New Venture[a]	$ 31,188	$ 69,685	$100,824
Data Library	71,847	47,095	40,016
Total multi-client revenues[b]	103,035	116,780	140,840
Imaging Services	22,543	19,740	16,409
Total	$125,578	$136,520	$157,249
Operations Optimization:			
Optimization Software & Services	$ 23,140	$ 21,129	$ 16,695
Devices	25,961	22,396	23,610
Total	$ 49,101	$ 43,525	$ 40,305
Total	$174,679	$180,045	$197,554

(a) Includes net revenues generated by our E&P Advisors group.

(b) Excluding item (a) above, this represents net revenues generated our Ventures group.

	Year Ended December 31, 2019			Year Ended December 31, 2018			Year Ended December 31, 2017		
	As Reported	Special Items	As Adjusted	As Reported	Special Items	As Adjusted	As Reported	Special Items	As Adjusted
	(In thousands, except per share data)								
Gross profit (loss):									
E&P Technology & Services	$ 35,699	$ 9,072[(b)]	**$ 44,771**	$ 43,369	$ —	**$ 43,369**	$ 65,196	$ —	**$ 65,196**
Operations Optimization	24,323	—	**24,323**	22,293	—	**22,293**	20,076	—	**20,076**
Segment gross profit	60,022	9,072	**69,094**	65,662	—	**65,662**	85,272	—	**85,272**
Other[(a)]	—	—	**—**	(6,042)	—	**(6,042)**	(9,633)	—	**(9,633)**
Total	**$ 60,022**	**$ 9,072**	**$ 69,094**	**$ 59,620**	**$ —**	**$ 59,620**	**$ 75,639**	**$ —**	**$ 75,639**
Gross margin:									
E&P Technology & Services	28%	8%	**36%**	32%	—%	**32%**	41%	—%	**41%**
Operations Optimization	50%	—%	**50%**	51%	—%	**51%**	50%	—%	**50%**
Segment gross margin	34%	6%	**40%**	36%	—%	**36%**	43%	—%	**42%**
Other	—%	—%	**—%**	(3)%	—%	**(3)%**	(5)%	—%	**(5)%**
Total	34%	6%	**40%**	33%	—%	**33%**	38%	—%	**38%**
Income (loss) from operations:									
E&P Technology & Services	$ 8,833	$ 9,072[(b)]	**$ 17,905**	$ 21,758	$ —	**$ 21,758**	$ 42,505	$ —	**$ 42,505**
Operations Optimization	8,189	—	**8,189**	7,295	—	**7,295**	8,022	—	**8,022**
Support and other	(41,481)[(e)]	5,720[(c)]	**(35,761)**	(83,325)[(e)]	38,658[(d)]	**(44,667)**	(59,226)[(e)]	6,141[(f)]	**(53,085)**
Total	$(24,459)	$14,792	**$ (9,667)**	$(54,272)	$38,658	**$(15,614)**	$ (8,699)	$ 6,141	**$ (2,558)**
Operating margin:									
E&P Technology & Services	7%	7%	**14%**	16%	—%	**16%**	27%	—%	**27%**
Operations Optimization	17%	—%	**17%**	17%	—%	**17%**	20%	—%	**20%**
Support and other	(24)%	4%	**(20)%**	(46)%	21%	**(25)%**	(30)%	4%	**(26)%**
Total	(14)%	8%	**(6)%**	(30)%	21%	**(9)%**	(4)%	3%	**(1)%**
Net income (loss) applicable to common shares	$(48,199)	$14,347[(h)]	**$(33,852)**	$(71,171)	$38,658	**$(32,513)**	$(30,242)	$11,141[(g)]	**$(19,101)**
Diluted net income (loss) per common share	$ (3.41)	$ 1.01	**$ (2.40)**	$ (5.20)	$ 2.83	**$ (2.37)**	$ (2.55)	$ 0.94	**$ (1.61)**

(a) Relates to the gross loss of previously reported Ocean Bottom Integrated Technologies segment.

(b) Relates to the write-down of our multi-client data library.

(c) Represents severance expense of $2.8 million and stock appreciation right awards expense of $2.9 million.

(d) Represents a write-down of the cable-based ocean bottom acquisition technologies of $36.6 million and stock appreciation rights awards and related expenses for 2018 of $2.1 million.

(e) Includes loss from operations of previously reported Ocean Bottom Integrated Technologies segment of $1.7 million, $11.1 million and $16.3 million for 2019, 2018 and 2017, respectively, which includes item (a) above, operating expenses of $1.7 million, $5.1 million and $6.7 million for 2019, 2018 and 2017 and impairment charge of $36.6 million for 2018. Remaining balance primarily relates to operating expenses.

(f) Represents stock appreciation right awards and related expenses for 2017.

(g) In addition to item (f), also impacting net loss applicable to common shares was a loss contingency accrual of $5.0 million related to legal proceedings.

(h) In addition to item (b) and (c), also impacting net loss applicable to common shares was the tax impact of $0.4 million related to the write-down of our multi-client data library.

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. The financial results are reported in accordance with Generally Accepted Accounting Principles ("GAAP"). However, management believes that certain non-GAAP performance measures may provide users of this financial information, additional meaningful comparisons between current results and results in prior operating periods. One such non-GAAP financial measure is net income (loss) applicable to common shares as adjusted or adjusted net income (loss), which excludes certain charges or amounts. This adjusted net income (loss) is not a measure of financial performance under GAAP. Accordingly, it should not be considered as a substitute for income (loss) from operations, net loss or other income data prepared in accordance with GAAP.

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, 2019 (As Adjusted) Compared to Year Ended December 31, 2018 (As Adjusted)

Our total net revenues of $174.7 million for 2019 decreased $5.3 million, or 3%, compared to total net revenues of $180.0 million for 2018. Our overall gross profit percentage, as adjusted, for 2019 was 40%, compared to a gross profit percentage of 33% for 2018. Total operating expenses as a percentage of total net revenues for 2019 and 2018 were 45% and 42%, as adjusted, respectively. During 2019, our loss from operations as adjusted, was $9.7 million, compared to a loss of $15.6 million for 2018.

Our net loss as adjusted, for 2019 was $33.9 million, or a loss of $2.40 per share, compared to net loss of $32.5 million or a loss of $2.37 per share for 2018. As noted above, our net loss for 2019 and 2018 included other special items totaling $14.3 million and $38.7 million, respectively, impacting our loss per share by $1.01 and $2.83, respectively.

Net Revenues, Gross Profits and Gross Margins

E&P Technology & Services—Net revenues for 2019 decreased by $10.9 million, or 8%, to $125.6 million, compared to $136.5 million for 2018. Within the E&P Technology & Services segment, total multi-client revenues were $103.0 million, a decrease of 12%, with New Venture revenues experiencing significant declines during 2019 resulting from timing and scale of new multi-client programs. Partially offsetting the overall decline in New Venture revenues was an increase in Data Library revenues of $24.8 million, or 53%, attributable to sales of South American data. Imaging Services revenues were $22.5 million, a 14% increase, attributable to modest market improvement and the successful execution of our strategy to focus on key clients, applications and basins that benefit from and enable us to continue enhancing our advanced technologies.

Gross profit as adjusted, increased by $1.4 million to $44.8 million, representing a 36% gross margin, compared to $43.4 million, or 32% gross margin, for 2018. The increase in gross profit and margin were due to increases in Data Library and Imaging Services revenues, as noted above.

Operations Optimization—Net revenues for 2019 increased by $5.6 million, or 13%, to $49.1 million, compared to $43.5 million for 2018. Optimization Software & Services net revenues increased by $2.0 million, or 10%, to $23.1 million, compared to $21.1 million for 2018 due to an increase in deployments of and associated engineering services related to our Marlin offshore optimization software. Devices revenues for 2019 increased by $3.6 million, or 16%, to $26.0 million, compared to $22.4 million for 2018. This increase was due to an increase in sales of marine equipment replacement and repairs. Operations Optimization gross profit for 2019 increased by $2.0 million to $24.3 million, in 2019, compared to $22.3 million, for 2018. Gross margin were consistent for both 2019 and 2018.

Operating Expenses (As Adjusted)

The following table presents the "As Adjusted" in both 2019 and 2018, excluding other special items (in thousands):

	Year Ended December 31, 2019			Year Ended December 31, 2018		
	As Reported	Special Items	As Adjusted	As Reported	Special Items	As Adjusted
Operating expenses:						
Research, development and engineering	$19,025	$ —	$19,025	$ 18,182	$ —	$18,182
Marketing and sales	23,207	—	23,207	21,793	—	21,793
General, administrative and other operating expenses	42,249	(5,720)[a]	36,529	37,364	(2,105)[b]	35,259
Impairment of long-lived assets	—	—	—	36,553	(36,553)[c]	—
Total operating expenses	$84,481	$(5,720)	$78,761	$113,892	$(38,658)	$75,234

(a) Represents severance expense of $2.8 million and stock appreciation right awards expense of $2.9 million.

(b) Represents stock appreciation rights awards and related expenses for 2018.

(c) Represents a write-down of the cable-based ocean bottom acquisition technologies.

Research, Development and Engineering—Research, development and engineering expense increased $0.8 million, or 5%, to $19.0 million, for 2019, compared to $18.2 million, for 2018. Increase is primarily driven by higher spend in developing imaging algorithms and infrastructure, devices and software. We see significant long-term potential in offerings that are designed to improve image quality, safety and productivity, which drives our investment decisions.

Marketing and Sales—Marketing and sales expense increased $1.4 million, or 6%, to $23.2 million, for 2019, compared to $21.8 million, for 2018. This increase was primarily due to increased commission expenses driven by increased data library sales within the E&P Technology and Services segment.

General, Administrative and Other Operating Expenses—General, administrative and other operating expenses increased $1.3 million, or 4%, to $36.5 million, as adjusted, for 2019 compared to $35.3 million, as adjusted, for 2018. The increase was related to compensation expense.

Other Items

Interest Expense, net—Interest expense, net, of $13.1 million for 2019 compared to $13.0 million for 2018. For additional information, please refer to "*—Liquidity and Capital Resources—Sources of Capital*" below.

Other Expense—Other expense for 2019 was $1.6 million compared to $0.4 million for 2018. Increase primarily relates to foreign exchange loss from our operations in Brazil.

Income Tax Expense—Income tax expense for 2019 was $8.1 million compared to $2.7 million for 2018. Our effective tax rates for 2019 and 2018 were 20.6% and 4.0%, respectively. The income tax expense for 2019 and 2018 primarily relates to profits generated by our non-U.S. businesses. Tax expense for 2019 and 2018 includes zero and $0.3 million, respectively, of tax benefit for the release of the valuation allowance against refundable U.S. alternative minimum tax ("AMT") credits. 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. Our effective tax rate for 2019 was negatively impacted by the change in valuation allowance related to U.S. operating losses for which we cannot currently recognize a tax benefit. See further discussion of establishment of the deferred tax valuation allowance at Footnote 7 "*Income Taxes*" of Footnotes to *Consolidated Financial Statements.*

Results of Operations

Year Ended December 31, 2018 (As Adjusted) Compared to Year Ended December 31, 2017 (As Adjusted)

Our total net revenues of $180.0 million for 2018 decreased $17.6 million, or 9%, compared to total net revenues of $197.6 million for 2017. Our overall gross profit percentage for 2018 was 33%, compared to a gross profit percentage of 38% for 2017. Total operating expenses as a percentage of total net revenues for 2018 and 2017 were 42% and 40%, as adjusted, respectively. During 2018, our loss from operations was $15.6 million, as adjusted, compared to a loss of $2.6 million, as adjusted, for 2017.

Our net loss for 2018 was $32.5 million, as adjusted, or a loss of $2.37 per share, compared to net loss of $19.1 million, as adjusted, or a loss of $1.61 per share for 2017. As noted above, our net loss for 2018 and 2017 included other special items totaling $38.7 million and $11.1 million, respectively, impacting our loss per share by $2.83 and $0.94, respectively.

Net Revenues, Gross Profits and Gross Margins

E&P Technology & Services—Net revenues for 2018 decreased by $20.7 million, or 13%, to $136.5 million, compared to $157.2 million for 2017. Within the E&P Technology & Services segment, total multi-client revenues were $116.8 million, a decrease of 17%, with New Venture revenues experiencing significant declines during 2018. Partially offsetting the overall decline in New Venture revenues was an increase in Data Library revenues, attributable to sales of the recently completed phases of the Brazil and Mexico reimaging programs, along with sales of 2D data libraries in Libya. The decrease in multi-client revenues was driven by the continued delay of the Panama license round announcement, the deferment of new E&P investments in Mexico and the continued focus on cash preservation within E&P companies restricting exploration spending. Imaging Services revenues were $19.7 million, a 20% increase, due to an increase in proprietary ocean bottom nodal imaging projects.

Gross profit decreased by $21.8 million to $43.4 million, representing a 32% gross margin, compared to $65.2 million, or 41% gross margin, for 2017. The decline in gross profit and margin were due to the decrease in New Venture revenues partly offset by the increases in Data Library and Imaging Services revenues, as noted above.

Operations Optimization—Net revenues for 2018 increased by $3.2 million, or 8%, to $43.5 million, compared to $40.3 million for 2017. Optimization Software & Services net revenues increased by $4.4 million, or 26%, to $21.1 million, compared to $16.7 million for 2017 due to increase in sales of our Gator ocean bottom command and control system. Devices revenues for 2018 decreased by $1.2 million, or 5%, to $22.4 million, compared to $23.6 million for 2017. This decrease was due to a decline in our repairs business due to seismic contractors focus on cash preservation and decrease in sales of our various product offerings. Operations Optimization gross profit for 2018 increased by $2.2 million to $22.3 million, in 2018, compared to $20.1 million, for 2017. Gross margin increased to 51% in 2018 from 50% in 2017.

Operating Expenses (As Adjusted)

The following table presents the "As Adjusted" in both 2018 and 2017, excluding other special items (in thousands):

	Year Ended December 31, 2018			Year Ended December 31, 2017		
	As Reported	Special Items	As Adjusted	As Reported	Special Items	As Adjusted
Operating expenses:						
Research, development and engineering	$ 18,182	$ —	$18,182	$16,431	$ —	$16,431
Marketing and sales	21,793	—	21,793	20,778	—	20,778
General, administrative and other operating expenses	37,364	(2,105)[(a)]	35,259	47,129	(6,141)[(a)]	40,988
Impairment of long-lived assets	36,553	(36,553)[(b)]	—	—		—
Total operating expenses	$113,892	$(38,658)	$75,234	$84,338	$(6,141)	$78,197

(a) Represents stock appreciation rights awards and related expenses for 2018 and 2017.

(b) Represents a write-down of the cable-based ocean bottom acquisition technologies.

Research, Development and Engineering—Research, development and engineering expense increased $1.8 million, or 11%, to $18.2 million, for 2018, compared to $16.4 million, for 2017. Increase is primarily driven by increased employment costs as we continue to invest in imaging algorithms and infrastructure, devices and software. We see significant long-term potential for investing in technologies that improve image quality, safety and productivity.

Marketing and Sales—Marketing and sales expense increased $1.0 million, or 5%, to $21.8 million, for 2018, compared to $20.8 million, for 2017. This increase was primarily due to increased marketing expenses to broaden and diversify our offerings into adjacent markets including consulting fees, partly offset by decrease in commission expense.

General, Administrative and Other Operating Expenses—General, administrative and other operating expenses decreased $5.7 million, or 14%, to $35.3 million, as adjusted, for 2018 compared to $41.0 million, as adjusted, for 2017. The decrease was driven by reductions in bonus expense due to current operating results.

Other Items

Interest Expense, net—Interest expense, net, of $13.0 million for 2018 compared to $16.7 million for 2017. The decrease in interest expense was a result of lower outstanding debt during 2018. For additional information, please refer to "*—Liquidity and Capital Resources—Sources of Capital*" below.

Other Expense—Other expense for 2018 was $0.4 million compared to other expense of $3.9 million for 2017. The difference primarily relates to changes in our accrual for loss contingency related to the WesternGeco legal proceedings. See further discussion at Footnote 8 *"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,	
	2018	2017
Reduction of (accrual for) loss contingency related to legal proceedings (Footnote 8)	$ —	$(5,000)
Recovery of INOVA bad debts	—	844
Other income (expense)	(436)	211
Total other expense	$(436)	$(3,945)

Income Tax Expense—Income tax expense for 2018 was $2.7 million compared to less than $0.1 million for 2017. Our effective tax rates for 2018 and 2017 were 4.0% and 0.1%, respectively. The income tax expense for 2018 and 2017 primarily relates to profits generated by our non-U.S. businesses. Tax expense for 2018 and 2017 includes a $0.3 million and $1.3 million, respectively tax benefit for the release of the valuation allowance against refundable U.S. alternative minimum tax ("AMT") credits. 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. Our effective tax rate for 2018 was negatively impacted by the change in valuation allowance related to U.S. operating losses for which we cannot currently recognize a tax benefit. See further discussion of establishment of the deferred tax valuation allowance at Footnote 7 "*Income Taxes*" of Footnotes to *Consolidated Financial Statements.*

Liquidity and Capital Resources

Sources of Capital

At December 31, 2019, we had total liquidity of $72.4 million, consisting of $33.1 million in cash on hand and $39.3 million of available borrowing capacity 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. At December 31, 2019, we had negative working capital of $23.6 million. Excluding current maturities of operating lease liabilities, our working capital would have been negative $12.5 million. Working capital requirements are primarily driven by our investment in our (i) multi-client data library ($28.8 million in 2019) and royalty payments for multi-client sales. Also, our headcount has traditionally been a significant driver of our working capital needs. As 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, typically in advance of related revenue billings and collections.

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 Credit Facility.

Revolving Credit Facility

On August 16, 2018, we and our material U.S. subsidiaries; GX Technology Corporation, ION Exploration Products (U.S.A), Inc. and I/O Marine Systems, Inc. (the "Material U.S. Subsidiaries"), along with GX Geoscience Corporation, S. de R.L. de C.V., a limited liability company (Sociedad de Responsibilidad Limitada de Capital Variable) organized under the laws of Mexico, and a subsidiary of the Company (the "Mexican Subsidiary,") (the Material U.S. Subsidiaries and the Mexican Subsidiary are collectively, the "Subsidiary Borrowers", together with ION Geophysical Corporation are the

"Borrowers"), the financial institutions party thereto, as lenders, and PNC Bank, National Association ("PNC"), as agent for the lenders, entered into that certain Third Amendment and Joinder to Revolving Credit and Security Agreement (the "Third Amendment"), amending the Revolving Credit and Security Agreement, dated as of August 22, 2014 (as previously amended by the First Amendment to Revolving Credit and Security Agreement, dated as of August 4, 2015 and the Second Amendment to Revolving Credit and Security Agreement, dated as of April 28, 2016, the "Credit Agreement"). The Credit Agreement, as amended by the First Amendment, the Second Amendment and the Third Amendment is herein called, the "Credit Facility"). The Third Amendment amended the Credit Agreement to, among other things:

- extend the maturity date of the Credit Facility by approximately four years (from August 22, 2019 to August 16, 2023), subject to the retirement or extension of the maturity date of the Second Lien Notes, as defined below, which mature on December 15, 2021;
- increase the maximum revolver amount by $10.0 million (from $40.0 million to $50.0 million);
- increase the borrowing base percentage of the net orderly liquidation value as it relates to the multi-client data library (not to exceed $28.5 million, up from the previous maximum of $15.0 million for the multi-client data library component);
- include the eligible billed receivables of the Mexican Subsidiary up to a maximum of $5.0 million in the borrowing base calculation and joins the Mexican Subsidiary as a borrower thereunder (with a maximum exposure of $5.0 million) and require the equity and assets of the Mexican Subsidiary to be pledged to secure obligations under the facility;
- modify the interest rate such that the maximum interest rate remains consistent with the fixed interest rate prior to the Third Amendment (that is, 3.00% per annum for domestic rate loans and 4.00% per annum for LIBOR rate loans), but lowers the range down to a minimum interest rate of 2.00% for domestic rate loans and 3.00% for LIBOR rate loans based on a leverage ratio for the preceding four-quarter period;
- decrease the minimum excess borrowing availability threshold which (if the Borrowers have minimum excess borrowing availability below any such threshold) triggers the agent's right to exercise dominion over cash and deposit accounts; and
- modify the trigger required to test for compliance with the fixed charge coverage ratio.

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. At December 31, 2019, the undrawn borrowing base availability under the Credit Facility was $39.3 million, and there was no outstanding indebtedness under the Credit Facility. The maturity of the Credit Facility will accelerate to October 31, 2021 if we are unable to repay or extend the maturity of the Second Lien Notes.

The Credit Facility requires us to maintain compliance with various covenants. At December 31, 2019, we are in compliance with all of the covenants under the Credit Facility. For further information regarding our Credit Facility see Footnote 5 "*Long-term Debt*" of Footnotes to *Consolidated Financial Statements*.

Senior Secured Notes

At December 31, 2019, ION Geophysical Corporation's 9.125% Senior Secured Second Priority Notes due December 2021 (the "Second Lien Notes") had an outstanding principal amount of $120.6 million and are senior secured second-priority obligations guaranteed by the Material U.S. Subsidiaries and the Mexican Subsidiary. Interest on the Second Lien Notes is payable semiannually in arrears on June 15 and December 15 of each year during their term, except that the interest payment otherwise payable on June 15, 2021 will be payable on December 15, 2021.

The April 2016 indenture governing the Second Lien Notes 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 in excess of permitted 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. All of our subsidiaries are currently restricted subsidiaries.

At December 31, 2019, we are in compliance with all of the covenants under the Second Lien Notes.

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	105.50%
2020	103.50%
2021	100.00%

Meeting our Liquidity Requirements

At December 31, 2019, our total outstanding indebtedness was approximately $121.5 million, consisting primarily of approximately $120.6 million outstanding Second Lien Notes, $1.9 million of equipment finance leases and $1.0 million of other short-term debt, partially offset by $2.0 million of debt issuance costs. At December 31, 2019, there was no outstanding indebtedness under our Credit Facility.

For the Current Period, total capital expenditures, including investments in our multi-client data library, were $31.2 million. We currently expect that our capital expenditures related to investments in our multi-client data library will be in the range of $30.0 million to $40.0 million in 2020, a portion of which will be pre-funded by our customers. Investments in our multi-client data library are dependent upon the timing of our New Venture projects and the availability of underwriting by our customers. We currently expect capital expenditures related to property, plant and equipment to be in the range of $5.0 million to $10.0 million in 2020.

We believe that our existing cash balance, cash from operations and undrawn availability under our Credit Facility will be sufficient to meet our anticipated cash needs for at least the next twelve months. However, should our costs and expenses prove to be greater than we currently anticipate or if we do not generate sufficient revenues to cover our working capital requirements, our operations will be severely affected. In addition, as described at Part I, Item 3. "*Legal Proceedings,*" there are possible scenarios involving an outcome in the WesternGeco lawsuit that could materially and adversely affect our liquidity, financial condition and results of operations.

Cash Flow from Operations

Net cash provided by operating activities was $34.2 million for 2019, compared to $7.1 million for 2018. The increase was primarily driven by collections of our combined accounts and unbilled receivable balance.

Net cash provided by operating activities was $7.1 million for 2018, compared to $27.6 million for 2017. The decrease was driven by lower revenue activity compared to 2017, payment of $3.8 million damages for the WesternGeco lawsuit, reductions in accounts payable and accrued expenses and increase in our combined accounts and unbilled receivable balance.

Cash Flow Used In Investing Activities

Net cash flow used in investing activities was $31.2 million for 2019, compared to $29.8 million for 2018. The principal uses of cash in our investing activities during 2019 were $28.8 million of investments in our multi-client data library and $2.4 million of investments in property, plant and equipment.

Net cash flow used in investing activities was $29.8 million for 2018, compared to $24.8 million for 2017. The principal uses of cash in our investing activities during 2018 were $28.3 million of investments in our multi-client data library and $1.5 million of investments in property, plant and equipment.

Cash Flow Used in Financing Activities

Net cash flow used in financing activities was $3.5 million for 2019, compared to $3.8 million net cash flow provided by financing activities in 2018. The net cash used in financing activities was primarily related to $2.6 million of payments on long-term debt, including equipment finance leases during 2019.

Net cash flow provided by financing activities was $3.8 million for 2018, compared to $3.6 million of net cash flow used in financing activities for 2017. The net cash flow provided by financing activities during 2018 was primarily related to $47.0 million of net cash received from our public equity offering, partially offset by $30.8 million of payments on long-term debt including equipment capital leases and a $10.0 million repayment of our Credit Facility.

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 second half of our fiscal year.

Future Contractual Obligations

The following table sets forth estimates of future payments of our consolidated contractual obligations, as of December 31, 2019 (in thousands):

Contractual Obligations	Total	Less Than 1 Year	1 - 3 Years	4 - 5 Years	More Than 5 Years
Long-term and short-term debt	$121,541	$ 972	$120,569	$ —	$—
Interest on long-term debt obligations	23,517	11,626	11,891	—	—
Equipment finance leases	2,010	1,254	756	—	—
Operating leases	52,726	12,708	30,887	9,128	3
Purchase obligations	5,814	5,814	—	—	—
Total	$205,608	$32,374	$164,103	$9,128	$ 3

The long-term and short-term debt at December 31, 2019 included $120.6 million of principal indebtedness outstanding under our Second Lien Notes that will mature in December 2021. The $2.0 million of equipment finance leases relates to Imaging Services' financing of computer and other equipment purchases.

The operating lease commitments at December 31, 2019 relate to our leases for certain equipment, offices, processing centers, and warehouse space. Our purchase obligations primarily relate to our committed inventory purchase orders under which deliveries of inventory are scheduled to be made in 2020.

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 (i) sale or license of multi-client and proprietary data, imaging services and E&P Advisors consulting services within our E&P Technology & Services segment; (ii) sale, license or repair of seismic data acquisition systems and other equipment and (iii) sale or license of seismic command and control software systems and software solutions for operations management within our Operations Optimization segment. All E&P Technology & Services' revenues and the services component of Optimization Software & Services' revenues under Operations Optimization segment are classified as services revenues. All other revenues are classified as product revenues.

We use a five-step model to determine proper revenue recognition from customer contracts. Revenue is recognized when (i) a contract is approved by all parties; (ii) the goods or services promised in the contract are identified; (iii) the consideration we expect to receive in exchange for the goods or services promised is determined; (iv) the consideration is allocated to the goods and services in the contract; and (v) control of the promised goods or services is transferred to the customer. We apply the practical expedient in Accounting Standards Codification Topic 606 ("ASC 606") and do not disclose the value of contractual future performance obligations such as backlog with an original expected length of one year or less.

Multi-client and Proprietary Surveys, Imaging Services and E&P Advisors Services—As multi-client seismic surveys are being designed, acquired or processed (the "New Venture" phase), we enter into non-exclusive licensing arrangements with our customers, who pre-fund or underwrite these acquisition programs in part. License revenues from these surveys are recognized during the New Venture phase as the seismic data is acquired and/or processed on a proportionate basis as work is performed and control is transferred to the customer. Under this method, we recognize revenue based upon quantifiable measures of progress, such as kilometers acquired or surveys of performance completed to date. Upon completion of a multi-client seismic survey, it is considered "on-the-shelf," and licenses to the survey data are granted to customers on a non-exclusive basis.

We also perform seismic surveys, imaging and other services 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 seismic surveys.

Acquisition Systems and Other Equipment—For sales of seismic data acquisition systems and other equipment, we recognize revenue when control of the goods has transferred to the customer. Transfer of control generally occurs when (i) we have a present right to payment; (ii) the customer has legal title to the asset; (iii) we have transferred physical possession of the asset; and (iv) the customer has significant rewards of ownership; or (v) the customer has accepted the asset.

Software—Licenses for our navigation, survey design and quality control software systems provide the customer with a right to use the software. We offer usage-based licenses under which we receive a monthly fee based on the number of vessels and licenses used. For these usage-based licenses, revenue is recognized as the performance obligations are performed over the contract term, which is generally two to five years. In addition to usage-based licenses, we offer perpetual software licenses as it exists when made available to the customer. Revenue from these licenses is recognized upfront at the point in time when the software is made available to the customer.

These arrangements generally include us providing related services, such as training courses, engineering services and annual software maintenance. We allocate consideration to each element of the arrangement based upon directly observable or estimated standalone selling prices. Revenue is recognized for these services as control transfers to the customer over time.

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 2019, 2018 and 2017, we capitalized, as part of our multi-client data library, $9.3 million, $11.9 million and $12.7 million, respectively, of direct internal processing costs.

Our method of amortizing the costs of an in-process multi-client survey (the period during which the seismic data is being acquired or processed, 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" survey data) and multiplying that percentage by the total cost of the project (the sales forecast method). We consider a multi-client survey to be complete when all work on the creation of the seismic data is finished and that 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 2019, an increase of 10% in the sales forecasts of all surveys would have increased our amortization expense by approximately $0.9 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, record an impairment charge with respect to such data. For 2019, we wrote down our multi-client data library by $9.1 million for programs with capitalized costs exceeding the remaining sales forecast.

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, 2019 and 2018 was $13.3 million and $15.0 million, respectively.

Goodwill

Goodwill is allocated to our reporting units, which is either the operating segment or one reporting level below the operating segment, which includes E&P Technology & Services, Optimization Software & Services and Devices. Goodwill is not amortized, but rather tested and assessed for impairment at least annually on December 31, or more frequently, if facts and circumstances indicate that the carrying amount may exceed fair value. 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.

The goodwill balance at December 31, 2019 was comprised of $20.6 million in our Optimization Software & Services and $2.9 million in our E&P Technology & Services reporting units. Based on our qualitative assessment performed as of December 31, 2019, 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. Accordingly, no further testing was required and no impairment was recognized. 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.

Long-lived Asset Impairment

We evaluate the recoverability of our property, plant and 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 undiscounted cash flows 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. No indicators of impairment were noted for 2019 and as such, no impairment charge was recognized. For 2018, we identified an indicator of impairment related to our cable-based ocean bottom acquisition technologies and recognized an impairment charge of $36.6 million.

Deferred Tax Assets

We established a valuation allowance on a substantial majority of our U.S. net deferred tax assets. A valuation allowance is 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.

Stock-Based Compensation

We estimate the value of stock-based payment awards on the date of grant using an option pricing model such as Black-Scholes or Monte Carlo simulation. The determination of the fair value of stock-based payment awards is affected by our 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 stock-based instrument exercise behaviors, risk-free interest rate and expected dividends. Forfeitures are estimated at the time of grant and revised, if necessary, in subsequent periods if actual forfeitures differ from those estimates. We recognize stock-based compensation expense on the straight-line basis over the requisite service period of each award that are ultimately expected to vest. For our stock appreciation rights, in the event that the market price of our common stock increases, our expectation of participants' expected exercise behavior and risk free interest rate change in the future, we may have to recognize additional SARs expense that could ultimately affect our operating results and cash flows.

Foreign Sales Risks

The majority of our foreign sales are denominated in U.S. dollars. Product revenues are allocated to geographical locations on the basis of the ultimate destination of the equipment, if known. If the ultimate destination of such equipment is not known, product revenues are allocated to the geographical location of initial shipment. Service revenues, which primarily relate to our E&P

Technology & Services segment, are allocated based upon the billing location of the customer. For 2019, 2018 and 2017, international sales comprised 73%, 75% and 76%, respectively, of total net revenues.

	Years Ended December 31,		
	2019	2018	2017
Latin America	$ 60,684	$ 68,871	$ 68,241
North America	46,684	44,474	48,120
Europe	30,722	31,077	44,930
Asia Pacific	13,242	17,817	18,896
Africa	10,083	10,837	6,837
Middle East	7,347	5,526	2,308
Other	5,917	1,443	8,222
Total	$174,679	$180,045	$197,554

Off-Balance Sheet Arrangements

Variable interest entities. At December 31, 2019, our investment in INOVA Geophysical constitutes an investment in a variable interest entity, as that term is defined in Accounting Standards Codification 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

At December 31, 2019, we had outstanding total indebtedness of approximately $121.5 million. At December 31, 2019, 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, Brazil, Mexico, 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 sheets at December 31, 2019 reflected approximately $9.7 million of net working capital related to our foreign subsidiaries, a majority of which is within the United Kingdom and Brazil. 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. In 2019, we recorded net foreign currency losses of approximately $1.3 million in other expense, a majority of these losses are due to currency fluctuations related to our operations in Brazil.

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.

Our management carried out an evaluation of the effectiveness of the design and operation of our disclosure controls and procedures as of December 31, 2019. 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, 2019.

(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;

(ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of 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, 2019 based upon criteria established in the 2013 *Internal Control-Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”). Based upon their assessment, management concluded that the internal control over financial reporting was effective as of December 31, 2019.

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, 2019, 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

Opinion on internal control over financial reporting

We have audited the internal control over financial reporting of ION Geophysical Corporation (a Delaware corporation) and subsidiaries (the "Company") as of December 31, 2019, based on criteria established in the 2013 *Internal Control-Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO"). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, 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) ("PCAOB"), the consolidated financial statements of the Company as of and for the year ended December 31, 2019, and our report dated February 6, 2020 expressed an unqualified opinion on those financial statements.

Basis for opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

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

Definition and limitations of internal control over financial reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

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

/s/ GRANT THORNTON LLP

Houston, Texas
February 6, 2020

Item 9B. ***Other Information***

Not applicable.

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 13, 2020 (the "2020 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 2020 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 2020 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 2020 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 2020 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.
4.1	—	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.
4.2	—	First Supplemental Indenture, dated as of April 28, 2016, to the Indenture, dated May 13, 2013, among ION Geophysical Corporation, the subsidiary guarantors named therein, Wilmington Savings Fund Society, FSB, as trustee, and U.S. Bank National Association, as collateral agent, filed on April 28, 2016 as Exhibit 4.3 to the Company’s Current Report on Form 8-K and incorporated by reference.
4.3	—	Indenture, dated as of April 28, 2016, among ION Geophysical Corporation, the subsidiary guarantors named therein, Wilmington Savings Fund Society, FSB, as trustee and collateral agent filed on April 28, 2016 as Exhibit 4.1 to the Company’s Current Report on Form 8-K and incorporated by reference.
4.4	—	Intercreditor Agreement, dated as of April 28, 2016, by and among PNC Bank, National Association, as first lien representative and first lien collateral agent for the first lien secured parties, and Wilmington Savings Fund Society, FSB, as second lien representative and second lien collateral agent for the second lien secured parties and as third lien representative for the third lien secured parties, and U.S. Bank National Association as third lien collateral agent for the third lien secured parties and acknowledged and agreed to by ION Geophysical Corporation and the other grantors named therein, filed on April 28, 2016 as Exhibit 10.1 to the Company’s Current Report on Form 8-K and incorporated by reference.

*4.5	—	Description of Securities
**10.1	—	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.
**10.2	—	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.
**10.3	—	Sixth Amended and Restated—2004 Long-Term Incentive Plan, filed as Appendix A to the definitive proxy statement for the 2011 Annual Meeting of Stockholders of ION Geophysical Corporation, filed on April 21, 2011, and incorporated herein by reference.
**10.4	—	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.
**10.5	—	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.
10.6	—	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.
10.7	—	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.
10.8	—	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.
10.9	—	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.
**10.10	—	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.
10.11	—	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.
**10.12	—	Consulting Services Agreement dated January 1, 2013, between ION Geophysical Corporation and ThePeebler Group LLC, filed on January 4, 2013 as Exhibit 10.1 to the Company's Current Report on Form8-K, and incorporated herein by reference.

**10.13	—	Third Amended and Restated 2013 Long-Term Incentive Plan filed on November 1, 2018 as Annex A to the Registrant's Proxy Statement on Schedule 14A and incorporated herein by reference.
10.14	—	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.
10.15	—	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.
10.16	—	Second Amendment to the Revolving Credit and Security Agreement, dated as of April 28, 2016, among ION Geophysical Corporation and the subsidiary co-borrowers named therein, as borrowers, the financial institutions party thereto, as lenders, and PNC Bank, National Association, as agent for the lenders, filed on April 28, 2016 as Exhibit 10.2 to the Company's Current Report on Form 8-K and incorporated by reference.
**10.17	—	Employment Agreement dated effective as of November 13, 2014, between ION Geophysical Corporation and Steve Bate, filed as Exhibit 10.44 to the Company's Annual Report 10-K for the year ended December 31, 2014, and incorporated herein by reference.
**10.18	—	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.
**10.19	—	Form of Rights Agreement dated March 1, 2016 issued under the ION Stock Appreciation Rights Plan Dated November 17, 2008, and incorporated herein by reference.
**10.20	—	Equity Investment Agreement dated December 14, 2017, issued under the Second Amended and Restated 2013 Long-Term Incentive Plan dated December 31, 2016, and incorporated herein by reference.
**10.21	—	Employee Stock Purchase Plan dated May 26, 2010, and incorporated herein by reference.
10.22	—	Form of Warrant Agreement, filed on February 16, 2018 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
10.23	—	Third Amendment and Joinder to the Revolving Credit and Security Agreement, dated as of August 16, 2018, filed on August 21, 2018 as Exhibit 10.1 to the Company's Current Report on Form 8-K and incorporated herein by reference.
**10.24	—	ION Stock Appreciation Rights Plan dated November 30, 2018, and incorporated herein by reference.

**10.25	—	Form of Stock Appreciation Rights Agreement dated December 1, 2018 issued under the ION Stock Appreciation Rights Plans dated November 30, 2018, and incorporated herein by reference.
**10.26	—	Form of Restricted Stock Awards Agreement dated December 1, 2018 issued under the Third Amended and Restated 2013 Long-Term Incentive Plan dated November 1, 2018, and incorporated herein by reference.
10.27	—	Form of First Amendment to Warrant to Purchase Common Stock dated as of February 4, 2019, filed on February 8, 2019 as Exhibit 10.1 to the Company's Current Report of Form 8-K, and incorporated herein by reference.
**10.28	—	Separation Agreement dated as of June 3, 3019 between ION Geophysical Corporation and R. Brian Hanson filed on June 4, 2019 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
**10.29	—	Restricted Stock Agreement (Time Based) dated September 1, 2019 between the ION Geophysical Corporation and Christopher T. Usher filed on September 4, 2019 as Exhibit 10.1 to the Company's Current Report on Form 8-K, and incorporated herein by reference.
**10.30	—	Restricted Stock Agreement (Performance Based) dated September 1, 2019 between the ION Geophysical Corporation and Christopher T. Usher filed on September 4, 2019 as Exhibit 10.2 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, 2019 and 2018, (ii) Consolidated Statements of Operations for the years ended December 31, 2019, 2018 and 2017, (iii) Comprehensive Income (Loss) for the years ended December 31, 2019, 2018 and 2017, (iv) Consolidated Statements of Cash Flows for the years ended December 31, 2019, 2018 and 2017, (v) Consolidated Statements of Stockholders' (Deficit) Equity for the years ended December 31, 2019, 2018 and 2017, (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 6, 2020.

ION GEOPHYSICAL CORPORATION

By /s/ CHRISTOPHER USHER

Christopher Usher
President and Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Christopher Usher and Matthew Powers 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, 2019, 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/ CHRISTOPHER USHER Christopher Usher	President, Chief Executive Officer and Director (Principal Executive Officer)	February 6, 2020
/s/ MIKE MORRISON Mike Morrison	Executive Vice President and Interim Chief Financial Officer (Principal Financial Officer)	February 6, 2020
/s/ SCOTT SCHWAUSCH Scott Schwausch	Vice President and Corporate Controller (Principal Accounting Officer)	February 6, 2020
/s/ JAMES M. LAPEYRE, JR. James M. Lapeyre, Jr.	Chairman of the Board of Directors and Director	February 6, 2020

Name	Capacities	Date
/s/ DAVID H. BARR David H. Barr	Director	February 6, 2020
Zheng HuaSheng	Director	February 6, 2020
/s/ TINA WININGER Tina Wininger	Director	February 6, 2020
/s/ MICHAEL MCGOVERN Michael McGovern	Director	February 6, 2020
/s/ S. JAMES NELSON, JR. S. James Nelson, Jr.	Director	February 6, 2020
/s/ JOHN N. SEITZ John N. Seitz	Director	February 6, 2020

ION GEOPHYSICAL CORPORATION AND SUBSIDIARIES

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

Report of Independent Registered Public Accounting Firm

Board of Directors and Stockholders
ION Geophysical Corporation

Opinion on the financial statements

We have audited the accompanying consolidated balance sheets of ION Geophysical Corporation (a Delaware corporation) and subsidiaries (the "Company") as of December 31, 2019 and 2018, 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, 2019, and the related notes and schedule included under Item 15(a) (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with accounting principles generally accepted in the United States of America.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) ("PCAOB"), the Company's internal control over financial reporting as of December 31, 2019, 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 6, 2020 expressed an unqualified opinion.

Change in accounting principle

As discussed in Note 2 to the consolidated financial statements, the Company has changed its method of accounting for leases on January 1, 2019 using the modified retrospective method due to the adoption of Accounting Standards Codification 842, "Leases".

Basis for opinion

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

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

/s/ GRANT THORNTON LLP

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

Houston, Texas
February 6, 2020

ION GEOPHYSICAL CORPORATION AND SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS

	December 31, 2019	December 31, 2018
	(In thousands, except share data)	
ASSETS		
Current assets:		
Cash and cash equivalents	$ 33,065	$ 33,551
Accounts receivable, net	29,548	26,128
Unbilled receivables	11,815	44,032
Inventories, net	12,187	14,130
Prepaid expenses and other current assets	6,012	7,782
Total current assets	92,627	125,623
Deferred income tax asset, net	8,734	7,191
Property, plant and equipment, net	13,188	13,041
Multi-client data library, net	60,384	73,544
Goodwill	23,585	22,915
Right-of-use assets	32,546	47,803
Other assets	2,130	2,435
Total assets	$ 233,194	$ 292,552
LIABILITIES AND STOCKHOLDERS' (DEFICIT) EQUITY		
Current liabilities:		
Current maturities of long-term debt	$ 2,107	$ 2,228
Accounts payable	49,316	34,913
Accrued expenses	30,328	31,411
Accrued multi-client data library royalties	18,831	29,256
Deferred revenue	4,551	7,710
Current maturities of operating lease liabilities	11,055	12,214
Total current liabilities	116,188	117,732
Long-term debt, net of current maturities	119,352	119,513
Operating lease liabilities, net of current maturities	30,833	45,592
Other long-term liabilities	1,453	1,891
Total liabilities	267,826	284,728
(Deficit) Equity:		
Common stock, $0.01 par value; authorized 26,666,667 shares; outstanding 14,224,787 and 14,015,615 shares at December 31, 2019 and 2018, respectively.	142	140
Additional paid-in capital	956,647	952,626
Accumulated deficit	(974,291)	(926,092)
Accumulated other comprehensive loss	(19,318)	(20,442)
Total stockholders' (deficit) equity	(36,820)	6,232
Noncontrolling interests	2,188	1,592
Total (deficit) equity	(34,632)	7,824
Total liabilities and (deficit) equity	$ 233,194	$ 292,552

See accompanying Footnotes to Consolidated Financial Statements.

ION GEOPHYSICAL CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF OPERATIONS

	Years Ended December 31,		
	2019	2018	2017
	(In thousands, except per share data)		
Service revenues	$131,280	$139,038	$159,410
Product revenues	43,399	41,007	38,144
Total net revenues	174,679	180,045	197,554
Cost of services	83,519	100,557	100,820
Cost of products	22,066	19,868	18,791
Impairment of multi-client data library	9,072	—	2,304
Gross profit	60,022	59,620	75,639
Operating expenses:			
Research, development and engineering	19,025	18,182	16,431
Marketing and sales	23,207	21,793	20,778
General, administrative and other operating expenses	42,249	37,364	47,129
Impairment of long-lived assets	—	36,553	—
Total operating expenses	84,481	113,892	84,338
Loss from operations	(24,459)	(54,272)	(8,699)
Interest expense, net	(13,074)	(12,972)	(16,709)
Other expense, net	(1,617)	(436)	(3,945)
Loss before income taxes	(39,150)	(67,680)	(29,353)
Income tax expense	8,064	2,718	24
Net loss	(47,214)	(70,398)	(29,377)
Less: Net income attributable to noncontrolling interests	(985)	(773)	(865)
Net loss attributable to ION	$(48,199)	$(71,171)	$(30,242)
Net loss per share:			
Basic	$ (3.41)	$ (5.20)	$ (2.55)
Diluted	$ (3.41)	$ (5.20)	$ (2.55)
Weighted average number of common shares outstanding:			
Basic	14,131	13,692	11,876
Diluted	14,131	13,692	11,876

See accompanying Footnotes to Consolidated Financial Statements.

ION GEOPHYSICAL CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS

	Years Ended December 31,		
	2019	2018	2017
		(In thousands)	
Net loss	$(47,214)	$(70,398)	$(29,377)
Other comprehensive income (loss), net of taxes, as appropriate:			
Foreign currency translation adjustments	1,124	(1,563)	2,869
Comprehensive net loss	(46,090)	(71,961)	(26,508)
Comprehensive income attributable to noncontrolling interests	(985)	(773)	(865)
Comprehensive net loss attributable to ION	$(47,075)	$(72,734)	$(27,373)

See accompanying Footnotes to Consolidated Financial Statements.

ION GEOPHYSICAL CORPORATION AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF CASH FLOWS

	Years Ended December 31,		
	2019	2018	2017
	(In thousands)		
Cash flows from operating activities:			
Net loss	$(47,214)	$(70,398)	$(29,377)
Adjustments to reconcile net loss to net cash provided by operating activities:			
Depreciation and amortization (other than multi-client library)	3,657	8,763	16,592
Amortization of multi-client data library	39,541	48,988	47,102
Impairment of long-lived assets	—	36,553	—
Impairment of multi-client data library	9,072	—	2,304
Stock-based compensation expense	4,701	3,337	2,552
Accrual of loss contingency related to legal proceedings	—	—	5,000
Write-down of excess and obsolete inventory	517	665	398
Deferred income taxes	(1,940)	(6,252)	(5,420)
Change in operating assets and liabilities:			
Accounts receivable	(3,265)	(7,024)	1,692
Unbilled receivables	32,055	(5,245)	(23,947)
Inventories	1,067	(353)	190
Accounts payable, accrued expenses and accrued royalties	(2,492)	(7,600)	1,443
Deferred revenue	(3,207)	(1,112)	5,131
Other assets and liabilities	1,658	6,776	3,952
Net cash provided by operating activities	34,150	7,098	27,612
Cash flows from investing activities:			
Investment in multi-client data library	(28,804)	(28,276)	(23,710)
Purchase of property, plant and equipment	(2,411)	(1,514)	(1,063)
Net cash used in investing activities	(31,215)	(29,790)	(24,773)
Cash flows from financing activities:			
Borrowings under revolving line of credit	40,000	—	—
Repayments under revolving line of credit	(40,000)	(10,000)	—
Payments on notes payable and long-term debt	(2,553)	(30,807)	(4,816)
Cost associated with issuance of debt	—	(1,247)	(53)
Net proceeds from issuance of stocks	—	46,999	—
Proceeds from employee stock purchases and exercise of stock options	141	214	1,619
Other financing activities	(1,134)	(1,351)	(343)
Net cash provided by (used in) financing activities	(3,546)	3,808	(3,593)
Effect of change in foreign currency exchange rates on cash, cash equivalents and restricted cash	(125)	319	(260)
Net decrease in cash, cash equivalents and restricted cash	(736)	(18,565)	(1,014)
Cash, cash equivalents and restricted cash at beginning of period	33,854	52,419	53,433
Cash, cash equivalents and restricted cash at end of period	$ 33,118	$ 33,854	$ 52,419

The following table is a reconciliation of cash, cash equivalents and restricted cash:

	December 31,		
	2019	2018	2017
	(In thousands)		
Cash and cash equivalents	$33,065	$33,551	$52,056
Restricted cash included in prepaid expenses and other current assets	53	—	60
Restricted cash included in other long-term assets	—	303	303
Total cash, cash equivalents, and restricted cash shown in consolidated statements of cash flows	$33,118	$33,854	$52,419

See accompanying Footnotes to Consolidated Financial Statements.

ION GEOPHYSICAL CORPORATION AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' (DEFICIT) EQUITY

(In thousands, except shares)	Common Stock Shares	Common Stock Amount	Additional Paid-In Capital	Accumulated Deficit	Accumulated Other Comprehensive Loss	Noncontrolling Interests	Total (Deficit) Equity
Balance at January 1, 2017	11,792,447	$118	$899,198	$(824,679)	$(21,748)	$ 509	$ 53,398
Net (loss) income	—	—	—	(30,242)	—	865	(29,377)
Translation adjustment	—	—	—	—	2,869	(35)	2,834
Dividend payment to noncontrolling interest	—	—	—	—	—	(100)	(100)
Stock-based compensation expense	—	—	2,552	—	—	—	2,552
Exercise of stock options	15,000	—	46	—	—	—	46
Vesting of restricted stock units/awards	115,576	1	(1)	—	—	—	—
Vested restricted stock cancelled for employee minimum income taxes	(23,889)	—	(120)	—	—	—	(120)
Employee purchases of unregistered shares of common stock	120,567	1	1,572	—	—	—	1,573
Balance at December 31, 2017	12,019,701	120	903,247	(854,921)	(18,879)	1,239	30,806
Net (loss) income	—	—	—	(71,171)	—	773	(70,398)
Translation adjustment	—	—	—	—	(1,563)	(220)	(1,783)
Dividend payment to noncontrolling interest	—	—	—	—	—	(200)	(200)
Stock-based compensation expense	—	—	3,337	—	—	—	3,337
Exercise of stock options	70,086	1	213	—	—	—	214
Vesting of restricted stock units/awards	151,852	1	(1)	—	—	—	—
Vested restricted stock cancelled for employee minimum income taxes	(46,024)	—	(1,151)	—	—	—	(1,151)
Public equity offering	1,820,000	18	46,981	—	—	—	46,999
Balance at December 31, 2018	14,015,615	140	952,626	(926,092)	(20,442)	1,592	7,824
Net (loss) income	—	—	—	(48,199)	—	985	(47,214)
Translation adjustment	—	—	—	—	1,124	(74)	1,050
Dividend payment to noncontrolling interest	—	—	—	—	—	(315)	(315)
Stock-based compensation expense	—	—	4,701	—	—	—	4,701
Exercise of stock options	86,900	1	140	—	—	—	141
Vesting of restricted stock units/awards	225,860	2	(2)	—	—	—	—
Vested restricted stock cancelled for employee minimum income taxes	(103,588)	(1)	(818)	—	—	—	(819)
Balance at December 31, 2019	14,224,787	$142	$956,647	$(974,291)	$(19,318)	$2,188	$(34,632)

See accompanying 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 period presentation, including the change in reportable segments presentation which had no impact on the consolidated financial statements and the recognition of right-of-use ("ROU") assets and operating lease liabilities on the consolidated balance sheets as a result of the adoption of the new lease standard. See Footnote 2 *"Recent Accounting Pronouncements."* and Footnote 3 *"Segment and Geographic Information."*

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America ("GAAP") 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, collectability of accounts and unbilled receivables, inventory valuation reserves, sales forecasts related to multi-client data libraries, impairment of property, plant and equipment and goodwill and deferred taxes. Actual results could materially differ from those estimates.

Foreign Currency Transactions

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, as they occur, are included in "Other expense, net" on the consolidated statements of operations. Total foreign currency transaction losses were $1.3 million, $0.4 million and $1.6 million for 2019, 2018 and 2017, respectively. The foreign currency transaction losses are primarily due to the currency rate fluctuations between the US dollar and the Brazilian real related to the Company's operations in Brazil.

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 insurance limit. At December 31, 2019 and 2018, there was $0.1 million and $0.3 million, respectively, of long-term and short-term restricted cash used to secure standby and commercial letters of credit, which is included within "Other assets" and "Prepaid expenses and other current assets" in the consolidated balance sheets.

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 devices equipment repairs 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 net realizable value. The Company provides reserves for estimated obsolescence or excess inventory equal to the difference between cost of inventory and its estimated net realizable 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 and Equipment

Property, plant and 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 major renewals and betterments, that increase the value or extend the economic useful life of the asset, are capitalized and depreciated. 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 "Other expense, net" in the consolidated statements of operations.

Long-lived Asset Impairment

The Company evaluates the recoverability of long-lived assets, including property, plant and 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 is recognized whenever anticipated future undiscounted cash flows the assets are expected to generate 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. No indicators of impairment were noted for 2019 and as such no impairment charge was recognized. For 2018, the Company identified an indicator of impairment as it relates to its cable-based ocean bottom acquisition technologies and recognized an impairment charge of $36.6 million.

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 2019, 2018 and 2017, the Company capitalized, as part of its multi-client data library, $9.3 million, $11.9 million and $12.7 million, respectively, of direct internal processing costs.

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, 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 indicating 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, records an impairment charge with respect to such data. For 2019, the Company wrote down its multi-client data library by $9.1 million for programs with capitalized costs exceeding the remaining sales forecast.

Goodwill

Goodwill represents the excess of costs over the fair value of the net assets acquired in connection with a business combination. Goodwill is allocated to reporting units, which are either the operating segment or one reporting level below the operating segment, which includes E&P Technology & Services, Optimization Software & Services and Devices. Goodwill is not amortized, but rather tested and assessed for impairment at least annually on December 31, or more frequently, if facts and circumstances indicate that the carrying amount may exceed fair value. The Company begins with 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, as defined in Footnote 15 *"Fair Value of Financial Instruments."* 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 goodwill impairment. An impairment loss 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. The goodwill balance at December 31, 2019 was comprised of $20.6 million in the Optimization Software & Services and $2.9 million in the E&P Technology & Services reporting units. See further discussion below at Footnote 11 "*Goodwill*."

Equity Method Investment

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 Inc. ("BGP"), a subsidiary of China National Petroleum Corporation and 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.

In 2014, the Company fully impaired its investment in INOVA reducing its equity investment in INOVA and its share of INOVA's accumulated other comprehensive loss, both to zero. At December 31, 2019, 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.

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. Net income attributable to noncontrolling interests is stated separately in the consolidated statements of operations. The activity for this noncontrolling interest relates to proprietary processing projects in Brazil.

Revenue From Contracts With Customers

The Company derives revenue from the sale or license of (i) multi-client and proprietary data, imaging services and E&P Advisors consulting services within its E&P Technology & Services segment; (ii) sale, license and repair of seismic data acquisition systems and other equipment; and (iii) sale or license of seismic command and control software systems and software solutions for operations management within its Operations Optimization segment. All E&P Technology & Services' revenues and the services component of Optimization Software & Services' revenues under Operations Optimization segment are classified as services revenues. All other revenues are classified as product revenues.

The Company uses a five-step model to determine proper revenue recognition from customer contracts. Revenue is recognized when (i) a contract is approved by all parties; (ii) the goods or services promised in the contract are identified; (iii) the consideration the Company expects to receive in exchange for the goods or services promised is determined; (iv) the consideration is allocated to the goods and services in the contract; and (v) control of the promised goods or services is transferred to the customer. The Company does not disclose the value of contractual future performance obligations such as backlog with an original expected length of one year or less within the footnotes. See further discussion below at Footnote 4 "*Revenue from Contracts with Customers*."

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 issues stock-based payment awards to employees and directors, including employee stock options, restricted stock units, restricted stocks and stock appreciation rights. The Company estimates the value of stock-based payment awards on the date of grant using an option pricing model such as Black-Scholes or Monte Carlo simulation. The determination of the fair value of stock-based payment awards 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 stock-based instrument exercise behaviors, risk-free interest rate and expected dividends. Forfeitures are estimated at the time of grant and revised, if necessary, in subsequent periods if actual forfeitures differ from those estimates. The Company recognizes stock-based compensation expense on the straight-line basis over the requisite service period of each award that are ultimately expected to vest.

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 7 "*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.

(2) Recent Accounting Pronouncements

Accounting Pronouncements Recently Adopted

On January 1, 2019, the Company adopted Accounting Standards Update ("ASU") 2016-2, *"Leases (Topic 842)"* using the modified retrospective method. This ASU requires the recognition of lease assets and lease liabilities by lessees for those leases classified as operating leases under the previous guidance. The Company used January 1, 2018, the beginning of the earliest comparative period presented in its consolidated financial statements, as the date of initial application. The Company elected the practical expedients upon transition which will retain the lease classification for leases and any unamortized initial direct costs that existed prior to the adoption of the standard.

The adoption of the standard resulted in ROU assets of $59.5 million and operating lease liabilities of $70.6 million on the consolidated balance sheets as of January 1, 2018. The difference between the ROU assets and operating lease liabilities is due to the derecognition of $11.1 million in deferred rent recorded within other long-term liabilities. There was no impact on the consolidated statements of operations and cash flows. The adoption of the standard had no impact on the debt covenant compliance under existing agreements. The Company elected the practical expedient related to short-term leases, which are leases with a duration of twelve months or less, and as such, they have not been recorded in the consolidated balance sheets. See Footnote 14 "*Lease Obligations.*" for further discussion.

Accounting Pronouncements Not Yet Adopted

In June 2016, the Financial Accounting Standards Board ("FASB") issued ASU No. 2016-13, "*Financial Instruments—Credit Losses: Measurement of Credit Losses on Financial Instruments.*" The guidance will replace the incurred loss impairment methodology under current GAAP with a methodology that reflects expected credit losses and requires consideration of a broader range of reasonable and supportable information to inform credit loss estimates. The guidance is effective for public companies for interim and annual periods beginning after December 15, 2019, with early adoption permitted for interim and annual periods beginning after December 15, 2018. The Company does not currently expect the adoption of this standard to have a material impact on the consolidated financial statements.

On January 26, 2017, the FASB issued ASU 2017-04, *"Intangibles—Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment."* This guidance simplifies the accounting for goodwill impairment by eliminating step 2 from the goodwill impairment test. Entities will record an impairment charge based on the excess of a reporting unit's carrying amount over its fair value. The ASU is effective for annual and interim impairment tests performed in periods beginning after December 15, 2019. The ASU is not expected to have a material impact on the consolidated financial statements as it relates to how the Company tests goodwill for impairment.

(3) Segment and Geographic Information

During the first quarter of 2019, the Company consolidated its operating segments from three into two, eliminating the separate presentation of its Ocean Bottom Integrated Technologies segment. This consolidation aligns with the Company's asset light business model and evolved strategy to commercialize components of the Company's next generation ocean bottom nodal system, 4Sea, instead of operating a crew. The Company is offering 4Sea components more broadly to the growing number of OBS service providers under recurring revenue commercial strategies. The Company may also license the right to manufacture and use the 4Sea nodal technology to a service provider on a value-based pricing model, such as a royalty stream. Revenues from 4Sea are being recognized through the relevant segment, either E&P Technology & Services or Operations Optimization.

Accordingly, as of first quarter 2019, the Company evaluates and reviews its results based on two reporting segments: E&P Technology & Services and Operations Optimization.

The segments represent components of the Company for which separate financial information is available that is utilized on a regular basis by the Chief Operating Decision Maker in determining how to allocate resources and evaluate performance. The Company measures segment operating results based on income (loss) from operations.

Previously reported segment information has been retrospectively revised throughout the consolidated financial statements, as applicable, for all periods presented to reflect the changes in the Company's reporting segments. These changes did not have an impact on the Company's consolidated financial statements. These changes did not affect the Company's reporting units used for allocating and testing goodwill for impairment.

A summary of segment information follows (in thousands):

	Years Ended December 31, 2019	2018	2017
Net revenues:			
E&P Technology & Services:			
New Venture[a]	$ 31,188	$ 69,685	$100,824
Data Library	71,847	47,095	40,016
Total multi-client revenues[b]	103,035	116,780	140,840
Imaging Services	22,543	19,740	16,409
Total	$125,578	$136,520	$157,249
Operations Optimization:			
Optimization Software & Services	$ 23,140	$ 21,129	$ 16,695
Devices	25,961	22,396	23,610
Total	$ 49,101	$ 43,525	$ 40,305
Total net revenues	$174,679	$180,045	$197,554
Gross profit (loss):			
E&P Technology & Services	$ 35,699	$ 43,369	$ 65,196
Operations Optimization	24,323	22,293	20,076
Segment gross profit	60,022	65,662	85,272
Other	—	(6,042)[c]	(9,633)[c]
Total gross profit	$ 60,022	$ 59,620	$ 75,639
Gross margin:			
E&P Technology & Services	28%	32%	41%
Operations Optimization	50%	51%	50%
Segment gross margin	34%	36%	43%
Other	—%	(3)%	(5)%
Total	34%	33%	38%
Income (loss) from operations:			
E&P Technology & Services	$ 8,833	$ 21,758	$ 42,505
Operations Optimization	8,189	7,295	8,022
Support and other	(41,481)[d]	(83,325)[d]	(59,226)[d]
Loss from operations	(24,459)	(54,272)	(8,699)
Interest expense, net	(13,074)	(12,972)	(16,709)
Other expense, net	(1,617)	(436)	(3,945)
Loss before income taxes	$(39,150)	$(67,680)	$(29,353)

(a) Includes net revenues generated by the E&P Advisors group.

(b) Excluding item (a) above, this represents net revenues generated by the Ventures group.

(c) Relates to gross loss primarily related to depreciation expense of previously reported Ocean Bottom Integrated Technologies segment.

(d) Includes loss from operations of previously reported Ocean Bottom Integrated Technologies segment of $1.7 million, $11.1 million and $16.3 million for 2019, 2018 and 2017, respectively, which includes item (b) above, operating expenses of $1.7 million, $5.1 million and $6.7 million for 2019, 2018 and 2017 and includes a charge of $36.6 million to write-down the cable-based ocean bottom acquisition technologies associated with the previously reported Ocean Bottom Integrated Technologies segment. Remaining balance primarily relates to operating expenses.

Intersegment sales are insignificant for all periods presented.

	Years Ended December 31,		
	2019	2018	2017
Depreciation and amortization expense (including multi-client data library):			
E&P Technology & Services	$41,813	$51,673	$53,663
Operations Optimization	940	995	1,349
Support and other[(a)]	445	5,083	8,682
Total	$43,198	$57,751	$63,694

(a) Includes depreciation and amortization of previously reported Ocean Bottom Integrated Technologies segment of zero, $4.2 million and $7.0 million for 2019, 2018 and 2017, respectively.

Depreciation and amortization expense recorded within cost of services and operating expenses in the consolidated statements of operations is allocated to segments based upon use of the underlying assets.

	December 31,	
	2019	2018
Total assets:		
E&P Technology & Services	$133,787	$191,207
Operations Optimization	56,927	54,933
Support and other[(a)]	42,480	46,412
Total	$233,194	$292,552

(a) Support and other assets include all assets specifically related to support personnel and operations and the majority of cash and cash equivalents.

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

	December 31,	
	2019	2018
North America	$104,808	$127,084
Latin America	34,633	69,673
Middle East	48,932	52,037
Europe	37,946	38,463
Other	6,875	5,295
Total	$233,194	$292,552

A summary of property, plant and equipment and multi-client data library, net of accumulated depreciation, amortization and impairment, by geographic area follows (in thousands):

	December 31,	
	2019	2018
North America	$56,566	$67,283
Latin America	14,826	18,067
Europe	2,095	1,140
Middle East	73	36
Other	12	59
Total	$73,572	$86,585

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

	Years Ended December 31,		
	2019	2018	2017
Latin America	$ 60,684	$ 68,871	$ 68,241
North America	46,684	44,474	48,120
Europe	30,722	31,077	44,930
Asia Pacific	13,242	17,817	18,896
Africa	10,083	10,837	6,837
Middle East	7,347	5,526	2,308
Other	5,917	1,443	8,222
Total	$174,679	$180,045	$197,554

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) Revenue from Contracts with Customers

Multi-client and Proprietary Surveys, Imaging Services and E&P Advisors Services—As multi-client seismic surveys are being designed, acquired or processed (the “New Venture” phase), the Company enters into non-exclusive licensing arrangements with its customers, who pre-fund or underwrite these acquisition programs in part. License revenues from these surveys are recognized during the New Venture phase as the seismic data is acquired and/or processed on a proportionate basis as work is performed and control is transferred to the customer. Under this method, the Company recognizes revenue based upon quantifiable measures of progress, such as kilometers acquired or surveys of performance completed to date. Upon completion of a multi-client seismic survey, it is considered “on-the-shelf,” and licenses to the survey data are granted to customers on a non-exclusive basis.

The Company also performs seismic surveys, imaging and other services under contracts with specific customers, whereby the seismic data is owned by those customers. The Company recognizes revenue 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 seismic surveys.

Acquisition Systems and Other Seismic Equipment—For sales of seismic data acquisition systems and other seismic equipment, the Company recognizes revenue when control of the goods has transferred to the customer. Transfer of control generally occurs when (i) the Company has a present right to payment; (ii) the customer has legal title to the asset; (iii) the Company has transferred physical possession of the asset; and (iv) the customer has significant rewards of ownership; or (v) the customer has accepted the asset.

Software—Licenses for the Company's navigation, survey design, quality control and offshore operations optimization software systems provide the customer with a right to use the software. The Company offers usage-based licenses under which it receives a monthly fee based on the number of vessels and licenses used. For these usage-based licenses, revenue is recognized as the performance obligations are performed over the contract term, which is generally two to five years. In addition to usage-based licenses, the Company offers perpetual software licenses as it exists when made available to the customer. Revenue from these licenses is recognized upfront at the point in time when the software is made available to the customer.

These arrangements generally include the Company providing related services, such as training courses, engineering services and annual software maintenance. The Company allocates consideration to each element of the arrangement based upon directly observable or estimated standalone selling prices. Revenue is recognized for these services as control transfers to the customer over time. The Company does not have any contractual future performance obligations with an original term of over one year.

Revenue by Segment and Geographic Area

See Footnote 3 *"Segment Information"* of Footnotes to *Consolidated Financial Statements* for revenue by segment and revenue by geographic area for 2019, 2018 and 2017.

Unbilled Receivables

Unbilled receivables relate to revenues recognized on multi-client surveys, imaging services and devices equipment repairs on a proportionate basis, and on licensing of multi-client data libraries for which invoices have not yet been presented to the customer. The following table is a summary of unbilled receivables (in thousands):

	December 31,	
	2019	2018
New Venture	$ 5,222	$38,430
Imaging Services	6,539	5,075
Devices	54	527
Total	$11,815	$44,032

The changes in unbilled receivables were as follows (in thousands):

Unbilled receivables at December 31, 2018	$ 44,032
Recognition of unbilled receivables	166,878
Revenues billed to customers	(199,095)
Unbilled receivables at December 31, 2019	$ 11,815

Deferred Revenue

Billing practices are governed by the terms of each contract based upon achievement of milestones or pre-agreed schedules. Billing does not necessarily correlate with revenue recognized on a proportionate basis as work is performed and control is transferred to the customer. Deferred revenue represents cash received in excess of revenue not yet recognized as of the reporting period, but will be recognized in future periods. The following table is a summary of deferred revenues (in thousands):

	December 31,	
	2019	2018
New Venture	$1,956	$5,797
Imaging Services	1,501	307
Devices	452	626
Optimization Software & Services	642	980
Total	$4,551	$7,710

The changes in deferred revenues were as follows (in thousands):

Deferred revenue at December 31, 2018	$ 7,710
Cash collected in excess of revenue recognized	4,642
Recognition of deferred revenue[a]	(7,801)
Deferred revenue at December 31, 2019	$ 4,551

[a] The majority of deferred revenue recognized relates to Company's Ventures group.

The Company expects to recognize a majority of deferred revenue within the next twelve months.

Credit Risks

In 2019, the Company had one customer with sales that exceeded 10% of the consolidated net revenues. Revenues related to this customer are included within the E&P Technology & Services segment. In 2018, the Company had two customers with sales that each exceeded 10% of the consolidated net revenues. In 2017, the Company had one customer with sales that exceeded 10% of the consolidated net revenues. Revenues related to this customer are included within the E&P Technology & Services segment.

At December 31, 2019, the Company had two customers with balances that, combined, accounted for 29% of the Company's total combined accounts receivable and unbilled receivable balances. At December 31, 2018, the Company had one customer with a balance that accounted for 23% of the Company's total combined accounts receivable and unbilled receivable balances.

Concentration of Foreign Sales Risk

The majority of the Company's foreign sales are denominated in U.S. dollars. For 2019, 2018 and 2017, international sales comprised 73%, 75% and 76%, respectively, of total net revenues. The volatility in oil prices have continued to impact the global market throughout 2019. 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.

(5) Long-term Debt

The following is a summary of long-term debt and lease obligation (in thousands):

	December 31, 2019	December 31, 2018
Senior secured second-priority lien notes *(maturing December 15, 2021)*	$120,569	$120,569
Revolving credit facility *(maturing August 16, 2023)*[(a)]	—	—
Equipment finance leases (see Footnote 14)	1,869	2,938
Other debt	972	1,159
Costs associated with issuances of debt	(1,951)	(2,925)
Total	121,459	121,741
Current maturities of long-term debt	(2,107)	(2,228)
Long-term debt, net of current maturities	$119,352	$119,513

(a) The maturity of the revolving credit facility will accelerate to October 31, 2021 if the Company is unable to repay or extend the maturity of the Second Lien Notes.

Revolving Credit Facility

On August 16, 2018, ION and its material U.S. subsidiaries—GX Technology Corporation, ION Exploration Products (U.S.A), Inc. and I/O Marine Systems Inc. (the "Material U.S. Subsidiaries")—along with GX Geoscience Corporation, S. de R.L. de C.V., a limited liability company (Sociedad de Responsibilidad Limitada de Capital Variable) organized under the laws of Mexico, and a subsidiary of the Company (the "Mexican Subsidiary"), (the Material U.S. Subsidiaries and the Mexican Subsidiary are collectively, the "Subsidiary Borrowers", together with ION Geophysical Corporation are the "Borrowers")—the financial institutions party thereto, as lenders, and PNC Bank, National Association ("PNC"), as agent for the lenders, entered into that certain Third Amendment and Joinder to Revolving Credit and Security Agreement (the "Third Amendment"), amending the Revolving Credit and Security Agreement, dated as of August 22, 2014 (as previously amended by the First Amendment to Revolving Credit and Security Agreement, dated as of August 4, 2015 and the Second Amendment to Revolving Credit and Security Agreement, dated as of April 28, 2016, the "Credit Agreement"). The Credit Agreement, as amended by the First Amendment, the Second Amendment and the Third Amendment is herein called, 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 Third Amendment amended the Credit Agreement to, among other things:

- extend the maturity date of the Credit Facility by approximately four years (from August 22, 2019 to August 16, 2023), subject to the retirement or extension of the maturity date of the Second Lien Notes, as defined below, which mature on December 15, 2021;
- increase the maximum revolver amount by $10.0 million (from $40.0 million to $50.0 million);
- increase the borrowing base percentage of the net orderly liquidation value as it relates to the multi-client data library (not to exceed $28.5 million, up from the previous maximum of $15.0 million for the multi-client data library component);
- include the eligible billed receivables of the Mexican Subsidiary up to a maximum of $5.0 million in the borrowing base calculation and joins the Mexican Subsidiary as a borrower thereunder

(with a maximum exposure of $5.0 million) and require the equity and assets of the Mexican Subsidiary to be pledged to secure obligations under the facility;

- modify the interest rate such that the maximum interest rate remains consistent with the fixed interest rate prior to the Third Amendment (that is, 3.00% per annum for domestic rate loans and 4.00% per annum for LIBOR rate loans), but lowers the range down to a minimum interest rate of 2.00% for domestic rate loans and 3.00% for LIBOR rate loans based on a leverage ratio for the preceding four-quarter period;
- decrease the minimum excess borrowing availability threshold which (if the Borrowers have minimum excess borrowing availability below any such threshold) triggers the agent's right to exercise dominion over cash and deposit accounts; and
- modify the trigger required to test for compliance with the fixed charge coverage ratio, which is further described below.

The maximum amount under the Credit Facility is the lesser of $50.0 million or a monthly borrowing base. 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. At December 31, 2019, the borrowing base under the Credit Facility was $39.3 million and there was no outstanding indebtedness under the Credit Facility.

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. However, the first-priority security interest in the other assets of the Mexican Subsidiary is capped to a maximum exposure of $5.0 million.

The Credit Facility contains covenants that, among other things, limit or prohibit the Borrowers, subject to certain exceptions and qualifications, from incurring additional indebtedness in excess of permitted indebtedness (including finance lease obligations), repurchasing equity, paying dividends or distributions, granting or incurring additional liens on the Borrowers' properties, pledging shares of the Borrowers' subsidiaries, entering into certain merger transactions, entering into transactions with the Company's affiliates, making certain sales or other dispositions of the Borrowers' assets, making certain investments, acquiring other businesses and entering into sale-leaseback transactions with respect to the Borrowers' property.

The Credit Facility, requires that the 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 earnings before interest, taxes, depreciation and amortization ("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) by a two-step process based on (i) a minimum excess borrowing availability threshold (excess borrowing availability less than $6.25 million for five consecutive business days or $5.0 million on any given business day, and (ii) the Borrowers' unencumbered cash maintained in a PNC deposit account is less than the Borrowers' then outstanding obligations.

At December 31, 2019, the Company was in compliance with all of the covenants under the Credit Facility.

The Credit Facility 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.

Senior Secured Notes

ION Geophysical Corporation's 9.125% Senior Secured Second Priority Notes due December 2021 (the "Second Lien Notes") are senior secured second-priority obligations guaranteed by the Material U.S Subsidiaries and the Mexican Subsidiary (each as defined above and herein below, with the reference to the Second Lien Notes, the "Guarantors"). Interest on the Second Lien Notes is payable semiannually in arrears on June 15 and December 15 of each year during their term, except that the interest payment otherwise payable on June 15, 2021 will be payable on December 15, 2021.

The April 2016 indenture governing the Second Lien Notes contains certain covenants that, among other things, limits or prohibits ION Geophysical Corporation'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 ION Geophysical Corporation's capital stock, redeeming ION Geophysical Corporation'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 ION Geophysical Corporation's subsidiaries are currently restricted subsidiaries.

At December 31, 2019, the Company was in compliance with all of the covenants under the Second Lien Notes.

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:

Date	Percentage
2019	105.50%
2020	103.50%
2021	100.00%

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

Years Ending December 31,	Second Lien Notes	Other Financing	Total
2020	$ —	$972	$ 972
2021	120,569	—	120,569
Total	$120,569	$972	$121,541

(6) Net Loss per Common Share

Basic net loss per common share is computed by dividing net loss applicable to common shares by the weighted average number of common shares outstanding during the period. Diluted net income 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 pursuant to outstanding stock options at December 31, 2019, 2018 and 2017 were 689,209, 785,890 and 890,341, respectively, were excluded as their inclusion would have an anti-dilutive effect. The total number of shares issuable pursuant to restricted stock units awards outstanding at December 31, 2019, 2018 and 2017 were 908,754, 1,044,125 and 201,702, respectively, were excluded as their inclusion would have an anti-dilutive effect.

(7) Income Taxes

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

	Years Ended December 31,		
	2019	2018	2017
Domestic	$(85,278)	$(59,212)	$(12,487)
Foreign	46,128	(8,468)	(16,866)
Total	$(39,150)	$(67,680)	$(29,353)

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

	Years Ended December 31,		
	2019	2018	2017
Current:			
Federal	$ —	$ —	$ (166)
State and local	2	65	116
Foreign	10,002	8,905	5,494
Deferred:			
Federal	—	(346)	(1,263)
Foreign	(1,940)	(5,906)	(4,157)
Total income tax expense	$ 8,064	$ 2,718	$ 24

A reconciliation of the expected income tax expense on income (loss) before income taxes using the statutory federal income tax rate of 21% for 2019 and 2018 and 35% for 2017 to income tax expense follows (in thousands):

	Years Ended December 31,		
	2019	2018	2017
Expected income tax expense at 21% for 2019 and 2018 and 35% for 2017	$ (8,222)	$(14,213)	$(10,274)
Foreign tax rate differential	(1,996)	74	(2,914)
Foreign tax differences	(327)	4,703	(5,610)
Global intangible low tax income inclusion	7,310	3,443	—
State and local taxes	2	65	116
Nondeductible expenses	865	1,604	4,308
Change in U.S. tax rate	—	—	77,410
Expired capital loss	—	—	1,114
Valuation allowance:			
Valuation allowance on expiring capital losses	—	—	(1,114)
Valuation allowance on operations	10,432	7,042	(63,012)
Total income tax expense	$ 8,064	$ 2,718	$ 24

As a result of the passage of the Tax Cut and Jobs Act (the "Act") in December 2017, the Company's U.S. deferred tax assets, liabilities, and associated valuation allowance at December 31, 2017 have been re-measured at the new U.S. federal tax rate of 21%

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

	December 31,	
	2019	2018
Deferred income tax assets:		
Accrued expenses	$ 1,588	$ 1,126
Allowance accounts	6,161	6,415
Net operating loss carryforward	105,844	96,854
Equity method investment	35,292	35,292
Original issue discount	6,000	8,073
Interest limitation	10,132	5,845
Basis in identified intangibles	7,090	4,146
Tax credit carryforwards	5,070	5,345
Other	4,443	4,600
Total deferred income tax asset	181,620	167,696
Valuation allowance	(170,937)	(160,505)
Net deferred income tax asset	10,683	7,191
Deferred income tax liabilities:		
Unbilled receivables	(1,949)	—
Total deferred income tax asset, net	$ 8,734	$ 7,191

At December 31, 2019, the Company has a valuation allowance on substantially all net U.S. deferred tax assets. The valuation allowance was released in 2017 with respect to refundable U.S. alternative minimum tax ("AMT") credits that will be realized as a result of provisions in the Act. A valuation allowance is 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, 2019, the Company had U.S. net operating loss carryforwards of approximately $311.8 million, expiring in 2034 and beyond, and net operating loss carryforwards outside of the U.S. of approximately $159.7 million, the majority of which expires beyond 2025.

At December 31, 2019, the Company has approximately $0.4 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 2019, 2018 and 2017, the aggregate changes in the Company's total gross amount of unrecognized tax benefits are summarized as follows (in thousands):

	Years Ended December 31,		
	2019	2018	2017
Beginning balance	$447	$447	$1,299
Increases in unrecognized tax benefits—current year positions	—	—	59
Decreases in unrecognized tax benefits—prior year position	—	—	(911)
Ending balance	$447	$447	$ 447

The Company's U.S. federal tax returns for 2016 and subsequent years remain subject to examination by tax authorities. The Company is no longer subject to Internal Revenue Service ("IRS") examination for periods prior to 2015, although carryforward attributes that were generated prior to 2015 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 2012 and subsequent years generally remain open to examination.

At December 31, 2019, the Company considered the outside book-over-tax basis difference in its foreign subsidiaries to be in the amount of approximately $45.2 million. United States income taxes have not been provided on this basis difference as it is the Company's intention to reinvest the undistributed earnings of its foreign subsidiaries to the extent they cannot be remitted to the United States without incurring incremental tax as provided in the Act.

(8) 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 (the "District Court"). In the lawsuit, styled *WesternGeco L.L.C. v. ION Geophysical Corporation*, WesternGeco alleged that the Company had infringed four of their patents concerning marine seismic surveys.

Trial began in July 2012, and the jury returned a verdict in August 2012. The jury found that the Company infringed on six "claims" contained in four of WesternGeco's patents by supplying the Company's DigiFIN® lateral streamer control units from the United States. (In patent law, a "claim" is a technical legal term; an infringer infringes on one or more "claims" of a given patent.)

In May 2014, the District Court entered a Final Judgment against the Company in the amount of $123.8 million. The Final Judgment also enjoined the Company from supplying DigiFINs or any parts unique to DigiFINs in or from the United States. The Company has conducted its business in compliance with the District Court's orders, and has reorganized its operations such that it no longer supplies DigiFINs or any parts unique to DigiFINs in or from the United States.

As of 2018, the Company has paid WesternGeco the $25.8 million of the Final Judgment (the portion of the judgment representing reasonable royalty damages and enhanced damages, plus interest).

However, as further described below, the balance of the judgment against the Company ($98.0 million, representing lost profits from surveys performed by the Company's customers outside of the United State, plus interest) has been vacated, and a new trial ordered, to determine what lost profit damages, if any, WesternGeco is entitled to.

The Final Judgment was vacated after it was appealed to the United States Court of Appeals for the Federal Circuit in Washington, D.C. (the “Court of Appeals”), then to the Supreme Court of the United States, which remanded the case, again, to the Court of Appeals.

On January 11, 2019, the Court of Appeals refused to disturb the award of reasonable royalties to WesternGeco (which the Company paid in 2016), but did not reinstate the lost profits award; rather, the Court of Appeals remanded the case back to the District Court to determine whether to hold a new trial as to lost profits.

On August 30, 2019, the District Court refused WesternGeco’s request to reinstate the lost profits awards against the Company, and instead ordered a new trial to determine what lost profits, if any, WesternGeco is entitled to from surveys performed by the Company’s customers outside of the United States.

The District Court’s basis for granting the new trial as to lost profits was that, subsequent to the jury verdict that awarded lost profits, the Patent Trial and Appeal Board (“PTAB”) of the Patent and Trademark Office, in an administrative proceeding, invalidated four of the six patent claims patent claims that formed the basis for the lost profits judgment against the Company (that is, the PTAB held that those four patent claims should never have been granted), and the Court of Appeals and the Supreme Court both subsequently refused to overturn that finding. A trial date for the new trial has not yet been set.

The Company may not ultimately prevail in the litigation and it could be required to pay lost profits if and when a new judgment issues in the new trial. The Company’s assessment that it does not have a loss contingency may change in the future due to developments at the District Court, and other events, such as changes in applicable law, and such reassessment could lead to the determination that a significant loss contingency is probable, which could have a material adverse effect on the Company’s business, financial condition and results of operations. The Company’s 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.

Other

In July 2018, the Company prevailed in an arbitration that it initiated against the Indian Directorate General of Hydrocarbons (“DGH”) relating to its ability to continue to license data under the IndiaSPAN program. The DGH filed a lawsuit in court in India to vacate the arbitration award; in connection with that lawsuit, the Company was ordered to escrow approximately $4.5 million in sales proceeds that the Company had received in respect of sales from the IndiaSPAN program, pending the outcome of the DGH’s challenge to the arbitration award. We challenged the escrow order, but on December 9, 2019, the Supreme Court of India ordered the Company to comply with it which will require the Company to deposit approximately $4.5 million in escrow in late February 2020. The Company prevailed on the merits in the arbitration and expect to have that award upheld in Indian court, which would result in release of its portion of the escrowed money.

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.

(9) Other Expense

A summary of other expense follows (in thousands):

	Years Ended December 31,		
	2019	2018	2017
Accrual for loss contingency related to legal proceedings (see Footnote 8)	$ —	$ —	$(5,000)
Recovery of INOVA bad debts	—	—	844
Other income (expense)	(1,617)	(436)	211
Total other expense, net	$(1,617)	$(436)	$(3,945)

(10) Details of Selected Balance Sheet Accounts

Accounts Receivable

A summary of accounts receivable follows (in thousands):

	December 31,	
	2019	2018
Accounts receivable, principally trade	$29,548	$26,558
Less: allowance for doubtful accounts	—	(430)
Accounts receivable, net	$29,548	$26,128

Inventories

A summary of inventories follows (in thousands):

	December 31,	
	2019	2018
Raw materials and purchased subassemblies	$ 18,509	$ 20,011
Work-in-process	2,079	1,032
Finished goods	4,932	8,111
Less: reserve for excess and obsolete inventories	(13,333)	(15,024)
Inventories, net	$ 12,187	$ 14,130

Total excess and obsolete inventory expense for 2019, 2018 and 2017 was $0.5 million, $0.7 million and $0.4 million, respectively.

Property, Plant and Equipment

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

	December 31, 2019	December 31, 2018
Buildings	$ 15,486	$ 15,707
Machinery and equipment	133,048	132,135
Seismic rental equipment	1,669	1,423
Furniture and fixtures	3,347	3,859
Other	31,142	30,104
Total	184,692	183,228
Less: accumulated depreciation	(134,951)	(133,634)
Less: impairment of long-lived assets	(36,553)	(36,553)
Property, plant, equipment and seismic rental equipment, net	$ 13,188	$ 13,041

Total depreciation expense, including amortization of assets recorded under equipment finance leases, for 2019, 2018 and 2017 was $3.1 million, $7.6 million and $15.2 million, respectively.

For 2019, the Company did not recognized any impairment. For 2018, the Company identified an indicator of impairment as it relates to its cable-based ocean bottom acquisition technologies and recognized an impairment charge of $36.6 million.

Multi-Client Data Library

At December 31, 2019 and 2018, multi-client data library costs and accumulated amortization consisted of the following (in thousands):

	December 31, 2019	December 31, 2018
Gross costs of multi-client data creation	$1,007,762	$ 972,309
Less: accumulated amortization	(816,401)	(776,860)
Less: impairments to multi-client data library	(130,977)	(121,905)
Multi-client data library, net	$ 60,384	$ 73,544

Total amortization expense for 2019, 2018 and 2017 was $39.5 million, $49.0 million and $47.1 million, respectively.

For 2019, the Company wrote down its multi-client data library by $9.1 million for programs with capitalized costs exceeding the remaining sales forecast.

Accrued Expenses

A summary of accrued expenses follows (in thousands):

	December 31, 2019	December 31, 2018
Compensation, including compensation-related taxes and commissions	$15,218	$14,502
Accrued multi-client data library acquisition costs	4,219	3,746
Income tax payable	5,367	7,577
Other	5,524	5,586
Total	$30,328	$31,411

(11) Goodwill

Changes in the carrying amount of goodwill for 2019 and 2018 are as follows (in thousands):

	E&P Technology & Services	Optimization Software & Services	Total
Balance at January 1, 2018	$2,943	$21,146	$24,089
Impact of foreign currency translation adjustments	—	(1,174)	(1,174)
Balance at December 31, 2018	2,943	19,972	22,915
Impact of foreign currency translation adjustments	—	670	670
Balance at December 31, 2019	$2,943	$20,642	$23,585

At December 31, 2019 and 2018, zero provision for impairment of goodwill is required.

(12) Stockholders' Equity and Stock-based Compensation

Public Equity Offering

On February 21, 2018, the Company completed the public equity offering (the "Offering") of its 1,820,000 shares of common stock at a public offering price of $27.50 per share, and warrants to purchase an additional 1,820,000 shares of the Company's common stock pursuant to the Registration Statement on Form S-3 (No. 33-213769) filed with the Securities and Exchange Commission under the Securities Act of 1933 and declared effective on December 2, 2016. The net proceeds from this Offering were $47.0 million, including transaction expenses. A portion of the net proceeds were used to retire the Company's $28.5 million Third Lien Notes in March 2018. The warrants have an exercise price of $33.60 per share, are immediately exercisable and were to expire on March 21, 2019. On February 4, 2019, the Company extended expiration of the warrants to March 21, 2020.

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. 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 at pre-established quarterly grant dates 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.

Transactions under the stock option plans are summarized as follows:

	Option Price per Share	Outstanding	Vested	Available for Grant
January 1, 2017	$3.10 - $245.85	847,635	348,353	599,720
Granted	13.15	156,000	—	(156,000)
Vested	—	—	149,537	—
Exercised	3.10	(15,000)	(15,000)	—
Cancelled/forfeited	3.10 - 245.85	(98,294)	(47,612)	82,118
Restricted stock granted out of option plans	—	—	—	(59,500)
Vested restricted stock forfeited or cancelled for employee minimum income taxes and returned to the plans	—	—	—	22,065
December 31, 2017	3.10 - 245.85	890,341	435,278	488,403
Increase in shares authorized	—	—	—	1,200,000
Granted	24.50	10,000	—	(10,000)
Vested	—	—	153,944	—
Exercised	3.10	(70,086)	(70,086)	—
Cancelled/forfeited	3.10 - 245.85	(44,365)	(44,231)	2,568
Restricted stock granted out of option plans	—	—	—	(996,775)
Vested restricted stock forfeited or cancelled for employee minimum income taxes and returned to the plans	—	—	—	48,524
December 31, 2018	$3.10 - $151.35	785,890	474,905	732,720
Granted	6.79 - 8.43	20,000	—	(20,000)
Vested	—	—	167,991	—
Exercised	3.10	(86,900)	(86,900)	—
Cancelled/forfeited	13.15 - 107.85	(29,781)	(22,281)	10,799
Restricted stock granted out of option plans	—	—	—	(157,155)
Vested restricted stock forfeited or cancelled for employee minimum income taxes and returned to the plans	—	—	—	170,254
December 31, 2019	$3.10 - $151.35	689,209	533,715	736,618

Stock options outstanding at December 31, 2019 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	477,764	$ 17.36	8.1 years	261,364	$ 12.63
$61.05 - $71.85	74,432	$ 62.18	3.7 years	134,739	$ 60.20
$81.60 - $99.60	94,827	$ 89.87	2.6 years	95,426	$ 89.76
$106.05 - $151.35	42,186	$108.86	1.3 years	42,186	$108.86
Totals	689,209	$ 37.78	5.5 years	533,715	$ 46.04

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, 2019	785,890	$35.33		5.4 years	$ 572
Options granted	20,000	$ 7.61	$4.91		
Options exercised	(86,900)	$ 3.10			
Options cancelled	(7,500)	$13.15			
Options forfeited	(22,281)	$67.88			
Total outstanding at December 31, 2019	689,209	$37.78		5.5 years	$1,071
Options exercisable and vested at December 31, 2019	533,715	$46.04		4.5 years	$ 742

The total intrinsic value of options exercised during 2019, 2018 and 2017 was $0.6 million, $1.4 million and less than $0.1 million, respectively. Cash received from option exercises under all share-based payment arrangements for 2019, 2018 and 2017 was $0.1 million, $0.2 million, and less than $0.1 million, respectively. The weighted average grant date fair value for stock option awards granted during 2019, 2018 and 2017 was $4.91, $15.23 and $8.10 per share, respectively.

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,		
	2019	2018	2017
Risk-free interest rates	1.62%	2.78%	2.14%
Expected lives (in years)	5.0	5.0	5.0
Expected dividend yield	—%	—%	—%
Expected volatility	84.64%	73.67%	74.41%

The computation of expected volatility during 2019, 2018 and 2017 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 2019, 2018 and 2017 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.

Restricted Stock and Restricted Stock Unit Plans

On November 30, 2018, the Company's stockholders approved certain amendments to the Company's Second Amended and Restated 2013 Long-term Incentive Plan (the "2013 LTIP") including increasing the total number of shares of common stock available for issuance under the 2013 LTIP by 1.2 million shares, for a total of approximately 1.7 million shares, eliminating the restriction on the number of shares in the 2013 LTIP that can be issued as full value awards and certain other technical updates and clarifications related to Section 162(m) of the internal revenue code, as amended.

The Company has issued restricted stock and restricted stock units under the Company's 2013 LTIP, as amended 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.

On December 1, 2018, the Company issued 900,002 restricted stocks to selected employees with a grant date fair value $7.19, $6.51 and $5.89 for each of the tranches. The vesting of these restricted stocks 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 three-year period beginning on the date of grant the 20-day trailing volume-weighted average price of a share of common stock reaches or exceeds (i) $17.50 for the first ⅓ of the awards, (ii) $22.50 for the second ⅓ of the awards, and (iii) $27.50 for the final ⅓ of the awards. The service condition restricts the ability of the holders to exercise awards until certain service milestones have been reached such that (i) no more than ⅓ of the awards may be exercised, if vested, on and after the first anniversary of the date of grant, (ii) no more than ⅔ 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.

The status of the Company's restricted stock and restricted stock unit awards for 2019 follows:

	Number of Shares/Units
Total nonvested at January 1, 2019	1,044,125
Granted	157,155
Vested	(225,860)
Forfeited	(66,666)
Total nonvested at December 31, 2019	908,754

At December 31, 2019, 2018 and 2017, the intrinsic value of restricted stock and restricted stock unit awards was approximately $7.9 million, $5.4 million and $4.0 million, respectively. The weighted average grant date fair value for restricted stock and restricted stock unit awards granted during 2019, 2018 and 2017 was $7.98, $10.60 and $11.36 per share, respectively. The total fair value of shares vested during 2019, 2018 and 2017 was $2.1 million, $3.8 million and $0.6 million, respectively.

Stock Appreciation Rights Plan

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 December 1, 2018, the Company issued 960,009 SARs awards to selected employees with an exercise price of $8.85 ("2018 SARs"). None of these 2018 SARs were awarded to non-employee directors. The 2018 SARs have the same service and market vesting conditions as the restricted stocks issued on December 1, 2018, as described above. The maximum value of each 2018 SARs is capped at $18.65 (the spread between the share price cap of $27.50 and the $8.85 per award price). At December 31, 2019, there were 768,009 2018 SARs outstanding and unvested.

The 2018 SARs are considered liability awards and as such, these amounts are incrementally accrued in the liability section of the consolidated balance sheets. The Company calculated the fair value of each 2018 SARs award using the following assumptions:

	Years Ended December 31,	
	2019	2018
Risk-free interest rates	1.9%	3.0%
Expected lives (in years)	5.31	5.31
Expected dividend yield	—%	—%
Expected volatility	79.0%	82.9%

On March 1, 2016, the Company issued 1,210,000 SARs awards to 15 selected key employees with an exercise price of $3.10 (“2016 SARs”). None of these 2016 SARs were awarded to non-employee directors. The vesting of these 2016 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 service 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. The maximum value of each 2016 SARs is capped at $19.40 (the spread between the share price cap of $22.50 and the $3.10 per award price). At December 31, 2019, there were 186,670 2016 SARs outstanding and vested.

On December 13, 2017, the Compensation Committee (the “Committee”) of the Board of Directors (the “Board”) of the Company authorized and approved the acceleration of the vesting date to December 13, 2017 for the second tranche of the Company’s outstanding 2016 SARs. The second tranche of the 2016 SARs awards was originally scheduled to vest on March 1, 2018. The vesting of the second tranche of the 2016 SARs awards was accelerated to facilitate the exercise by the 2016 SARs participants, if they so choose, of a larger portion of the 2016 SARs awards prior to year-end, as such an exercise would minimize the potential cash flow impact of any such exercise in the first quarter of 2018, would mitigate the ongoing mark to market accounting requirements for cash-settled 2016 SARs, and would afford the 2016 SARs participants liquidity to invest in common stock of the Company to further align their interests with those of the Company’s stockholders. Participants exercised 663,330 SARs awards at a $9.95 gain per share.

The 2016 SARs are considered liability awards and as such, these amounts are incrementally accrued in the liability section of the consolidated balance sheets. The Company calculated the fair value of each 2016 SARs award on the date of grant and remeasured at each reporting period. The 2016 SARs awards are measured at intrinsic value (i.e. the difference between the market price on the last day of the quarter and the strike price of the awards multiply by the number of awards vested) and marked to market each quarter until settled.

Additional information related to the Company's SARs 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, 2017	1,416,133	$ 7.70			
SARs exercised	(713,330)	$ 3.10			
SARs cancelled	(136,939)	$ 7.70			
Total outstanding at December 31, 2017	565,864	$13.49			
SARs granted	960,009	$ 8.85	$8.85		
SARs exercised	(34,999)	$ 3.10			
SARs forfeited	(9,333)	$45.00			
Total outstanding at December 31, 2018	1,481,541	$10.53			
SARs exercised	(158,334)	$ 3.10			
SARs cancelled	(368,528)	$20.99			
Total outstanding at December 31, 2019	954,679	$ 7.73		7.8 years	$1,042
SARs exercisable and vested at December 31, 2019	186,670	$ 3.10		6.2 years	$1,042

Stock-based Compensation Expense

The following tables summarizes stock-based compensation expense for 2019, 2018 and 2017 as follows (in thousands):

	Years Ended December 31,		
	2019	2018	2017
Stock-based compensation expense	$4,701	$3,337	$2,552
Tax benefit related thereto	(972)	(698)	(862)
Stock-based compensation expense, net of tax	$3,729	$2,639	$1,690

	Years Ended December 31,		
	2019	2018	2017
Stock appreciation rights expense	$2,910	$ 822	$ 6,611
Tax benefit related thereto	(611)	(173)	(2,314)
Stock appreciation rights expense, net of tax	$2,299	$ 649	$ 4,297

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

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

	Years Ended December 31,		
	2019	2018	2017
Cash paid during the period for:			
Interest	$12,381	$12,463	$14,181
Income taxes	11,065	3,260	7,030
Non-cash items from investing and financing activities:			
Purchase of computer equipment financed through capital leases	—	3,297	—
Investment in multi-client data library financed through trade payables and accruals	6,649	4,956	9,059

(14) Lease Obligations

The Company determines if an arrangement is a lease at inception by considering whether (1) explicitly or implicitly identified assets have been deployed in the agreement and (2) the Company obtains substantially all of the economic benefits from the use of that underlying asset and directs how and for what purpose the asset is used during the term of the agreement. Amounts related to operating leases are included in "Right-of-use assets", "Current maturities of operating lease liabilities" and "Operating lease liabilities, net of current maturities" in the consolidated balance sheets. Amounts related to finance leases are included in "Property, plant and equipment, net", "Current maturities of long-term debt", and "Long-term debt, net of current maturities" in the consolidated balance sheets.

ROU assets represent the Company's right to use an underlying asset for the lease term and operating lease liabilities represent the Company's obligation to make lease payments arising from the lease. ROU assets are recognized at the commencement date and consist of the present value of remaining lease payments over the lease term, initial direct costs and prepaid lease payments less any lease incentives. Operating lease liabilities are recognized at commencement date based on the present value of remaining lease payments over the lease term. The Company uses the implicit rate, when readily determinable or the incremental borrowing rate based on the information available at commencement date to determine the present value of lease payments. The lease terms may include options to extend or terminate the lease which are recorded in the financial statements if it is reasonably certain that the Company will exercise such options. Lease expense for lease payments is recognized on a straight-line basis over the lease term. Lease agreements with lease and non-lease components are accounted for separately. The Company does not recognize leases with terms of less than twelve months in the consolidated balance sheets and will recognize those lease payments in the consolidated statements of operations on a straight-line basis over the lease term.

The Company leases offices, processing centers, warehouse spaces and, to a lesser extent, certain equipment. These leases have remaining terms of 1 year to 6 years, some of which have options to extend for up to 10 years and/or options to terminate within 1 year. The options to renew are not recognized as part of the Company's ROU assets and operating lease liabilities as the Company is not reasonably certain that it will exercise these options.

Total operating lease expense, including short-term lease expense was $11.6 million, $12.3 million and $12.3 million for 2019, 2018 and 2017, respectively.

Future maturities of lease obligations follows (in thousands):

Years Ending December 31,	Operating Leases	Finance Leases	Total
2020	$ 12,708	$1,254	$ 13,962
2021	10,911	756	11,667
2022	10,718	—	10,718
2023	9,258	—	9,258
2024	5,109	—	5,109
Thereafter	4,022	—	4,022
Total lease payments	$ 52,726	$2,010	$ 54,736
Less imputed interest	(10,838)	(141)	(10,979)
Total	$ 41,888	$1,869	$ 43,757

The weighted average remaining lease term at December 31, 2019 and 2018 was 4.71 years and 5.26 years, respectively. The weighted average discount rate used to determine the operating lease liability at December 31, 2019 and 2018 was 6.47% and 6.25%, respectively.

Supplemental cash flow information related to leases follows:

	Years Ended December 31, 2019	2018
Cash paid for amounts included in the measurement of lease liabilities:		
Operating leases	$12,284	$12,914
Equipment finance leases	1,069	638

Equipment Finance Leases

The Company has entered into capital leases that are due in installments for the purpose of financing the purchase of computer equipment through 2021. Interest accrues under these leases at rates from 4.3% to 8.7% 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.

(15) 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. The three-tiered hierarchy is summarized as follows:

Level 1—Quoted prices in active markets for identical assets and liabilities.

Level 2—Other significant observable inputs.

Level 3—Significant unobservable inputs.

Due to their highly liquid nature, the amount of the Company's other financial instruments, including cash and cash equivalents, restricted cash, 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 at December 31, 2019 and 2018 were $123.4 million and $124.7 million, respectively, compared to its fair values of $116.6 million and $120.7 million at December 31, 2019 and 2018, respectively. The fair value of the Second Lien Notes was calculated using Level 1 inputs, including an active market price.

Fair value measurements are applied with respect to non-financial assets and liabilities measured on a non-recurring basis, which would consist of measurements primarily of goodwill, multi-client data library and property, plant and equipment.

(16) Benefit Plans

The Company has a 401(k) retirement savings plan, which covers employees at least 18 years of age. Employees may voluntarily contribute up to 90% of their compensation, as defined, to the plan. The Company matched the employee contribution at a rate of 50% of the first 6% of compensation contributed to the plan subject to a maximum of 3% of eligible compensation. Company contributions to the plans were $0.9 million, $0.9 million and $0.8 million for 2019, 2018 and 2017, respectively.

(17) Selected Quarterly Information—(Unaudited)

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

	Three Months Ended			
	March 31, 2019	June 30, 2019	September 30, 2019	December 31, 2019
Service revenues	$ 28,128	$30,407	$41,990	$ 30,755
Product revenues	8,828	11,368	11,249	11,954
Total net revenues	36,956	41,775	53,239	42,709
Gross profit	9,912	19,583	25,288	5,239
Income (loss) from operations	(15,937)	(2,553)	3,858	(9,827)
Interest expense, net	(3,112)	(3,111)	(3,155)	(3,696)
Other income (expense), net	(792)	96	(242)	(679)
Income tax expense	1,407	2,719	3,790	148
Net income attributable to noncontrolling interests	(112)	(335)	(394)	(144)
Net loss applicable to ION	$(21,360)	$ (8,622)	$ (3,723)	$(14,494)
Net loss per share:				
Basic	$ (1.52)	$ (0.61)	$ (0.26)	$ (1.02)
Diluted	$ (1.52)	$ (0.61)	$ (0.26)	$ (1.02)

	Three Months Ended			
	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018
Service revenues	$ 25,086	$ 15,752	$37,105	$ 61,095
Product revenues	8,422	8,991	10,095	13,499
Total net revenues	33,508	24,743	47,200	74,594
Gross profit (loss)	6,853	(1,517)	16,475	37,809
Loss from operations	(12,640)	(22,519)	(2,452)	(16,661)
Interest expense, net	(3,836)	(2,911)	(3,022)	(3,203)
Other income (expense), net	(791)	84	91	180
Income tax expense (benefit)	1,072	154	2,079	(587)
Net income attributable to noncontrolling interests	(87)	(366)	(74)	(246)
Net loss applicable to ION	$(18,426)	$(25,866)	$ (7,536)	$(19,343)
Net loss per share:				
Basic	$ (1.44)	$ (1.86)	$ (0.54)	$ (1.38)
Diluted	$ (1.44)	$ (1.86)	$ (0.54)	$ (1.38)

The sum of the quarterly per share information may not tie to per share information in the Consolidated Statements of Operations due to rounding.

(18) Certain Relationships and Related Party Transactions

For 2019, 2018 and 2017, the Company recorded revenues from BGP of $2.2 million, $4.9 million and $4.4 million, respectively. Receivables due from BGP were $1.5 million and $1.6 million at December 31, 2019 and 2018, respectively. BGP owned approximately 10.5% of the Company's outstanding common stock at December 31, 2019.

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 9.1% of the Company's outstanding common stock at December 31, 2019.

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 2019, 2018 and 2017, the Company paid Laitram and its affiliates $0.7 million, $0.4 million and $0.2 million, respectively, which consisted of manufacturing services and reimbursement of costs. In addition, the Company is currently subleasing approximately 47,800 square feet of office and warehouse space to Laitram. 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.

For 2019, the Company recorded revenues from sales to INOVA of $0.5 million related to geophones sold by our Devices group. No revenues were recorded from sales to INOVA for 2018 and 2017.

(19) Condensed Consolidating Financial Information

The Second Lien Notes were issued by ION Geophysical Corporation and are guaranteed by Guarantors, all of which are wholly-owned subsidiaries. The Guarantors have fully and unconditionally guaranteed the payment obligations of ION Geophysical Corporation with respect to the Second Lien Notes. The following condensed consolidating financial information presents the results of operations, financial position and cash flows for:

- ION Geophysical Corporation and the Guarantors (in each case, reflecting investments in subsidiaries utilizing the equity method of accounting).
- All other subsidiaries of ION Geophysical Corporation that are not Guarantors.
- 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 footnotes. For additional information pertaining to the Notes, see Item 7. *"Management's Discussion and Analysis of Financial Condition and Results of Operations"* in Part II of this Form 10-K.

	December 31, 2019				
Balance Sheet	**ION Geophysical Corporation**	**The Guarantors**	**All Other Subsidiaries**	**Consolidating Adjustments**	**Total Consolidated**
			(In thousands)		
ASSETS					
Current assets:					
Cash and cash equivalents	$ 8,426	$ 26	$ 24,613	$ —	$ 33,065
Accounts receivable, net	8	19,493	10,047	—	29,548
Unbilled receivables	—	7,314	4,501	—	11,815
Inventories, net	—	6,902	5,285	—	12,187
Prepaid expenses and other current assets	3,292	1,513	1,207	—	6,012
Total current assets	11,726	35,248	45,653	—	92,627
Deferred income tax asset	402	8,417	(85)	—	8,734
Property, plant and equipment, net	786	8,112	4,290	—	13,188
Multi-client data library, net	—	54,479	5,905	—	60,384
Investment in subsidiaries	841,522	279,327	—	(1,120,849)	—
Goodwill	—	—	23,585	—	23,585
Right-of-use assets	11,934	15,802	4,810	—	32,546
Intercompany receivables	—	287,692	99,884	(387,576)	—
Other assets	1,171	905	54	—	2,130
Total assets	$ 867,541	$ 689,982	$184,096	$(1,508,425)	$ 233,194
LIABILITIES AND EQUITY					
Current liabilities:					
Current maturities of long-term debt	$ 972	$ 1,135	$ —	$ —	$ 2,107
Accounts payable	2,259	44,641	2,416	—	49,316
Accrued expenses	9,933	9,982	10,413	—	30,328
Accrued multi-client data library royalties	—	18,616	215	—	18,831
Deferred revenue	—	3,465	1,086	—	4,551
Current maturities of operating lease liabilities	4,429	5,469	1,157	—	11,055
Total current liabilities	17,593	83,308	15,287	—	116,188
Long-term debt, net of current maturities	118,618	734	—	—	119,352
Operating lease liabilities, net of current maturities	11,208	15,346	4,279	—	30,833
Intercompany payables	755,524	—	—	(755,524)	—
Other long-term liabilities	1,418	35	—	—	1,453
Total liabilities	904,361	99,423	19,566	(755,524)	267,826
Equity:					
Common stock	142	290,460	47,776	(338,236)	142
Additional paid-in capital	956,647	180,700	203,909	(384,609)	956,647
Accumulated earnings (deficit)	(974,291)	396,793	18,837	(415,630)	(974,291)
Accumulated other comprehensive income (loss)	(19,318)	4,281	(21,907)	17,626	(19,318)
Due from ION Geophysical Corporation	—	(281,675)	(86,273)	367,948	—
Total stockholders' equity	(36,820)	590,559	162,342	(752,901)	(36,820)
Noncontrolling interests	—	—	2,188	—	2,188
Total equity	(36,820)	590,559	164,530	(752,901)	(34,632)
Total liabilities and equity	$ 867,541	$ 689,982	$184,096	$(1,508,425)	$ 233,194

Balance Sheet	ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Consolidating Adjustments	Total Consolidated
	December 31, 2018				
	(In thousands)				
ASSETS					
Current assets:					
Cash and cash equivalents	$ 13,782	$ 47	$ 19,722	$ —	$ 33,551
Accounts receivable, net	8	17,349	8,771	—	26,128
Unbilled receivables	—	12,697	31,335	—	44,032
Inventories, net	—	8,721	5,409	—	14,130
Prepaid expenses and other current assets	3,891	1,325	2,566	—	7,782
Total current assets	17,681	40,139	67,803	—	125,623
Deferred income tax asset	805	6,261	125	—	7,191
Property, plant and equipment, net	489	8,922	3,630	—	13,041
Multi-client data library, net	—	70,380	3,164	—	73,544
Investment in subsidiaries	836,002	247,359	—	(1,083,361)	—
Goodwill	—	—	22,915	—	22,915
Right-of-use assets	18,513	21,350	7,940	—	47,803
Intercompany receivables	—	305,623	60,255	(365,878)	—
Other assets	1,723	643	69	—	2,435
Total assets	$ 875,213	$ 700,677	$165,901	$(1,449,239)	$ 292,552
LIABILITIES AND EQUITY					
Current liabilities:					
Current maturities of long-term debt	$ 1,159	$ 1,069	$ —	$ —	$ 2,228
Accounts payable	2,407	29,602	2,904	—	34,913
Accrued expenses	7,011	10,036	14,364	—	31,411
Accrued multi-client data library royalties	—	29,040	216	—	29,256
Deferred revenue	—	6,515	1,195	—	7,710
Current maturities of operating lease liabilities	5,155	5,633	1,426	—	12,214
Total current liabilities	15,732	81,895	20,105	—	117,732
Long-term debt, net of current maturities	117,644	1,869	—	—	119,513
Operating lease liabilities, net of current maturities	17,841	21,237	6,514	—	45,592
Intercompany payables	716,051	—	—	(716,051)	—
Other long-term liabilities	1,713	178	—		1,891
Total liabilities	868,981	105,179	26,619	(716,051)	284,728
Equity:					
Common stock	140	290,460	47,776	(338,236)	140
Additional paid-in capital	952,626	180,700	203,908	(384,608)	952,626
Accumulated earnings (deficit)	(926,092)	390,691	(12,475)	(378,216)	(926,092)
Accumulated other comprehensive income (loss)	(20,442)	4,324	(22,023)	17,699	(20,442)
Due from ION Geophysical Corporation	—	(270,677)	(79,496)	350,173	—
Total stockholders' equity	6,232	595,498	137,690	(733,188)	6,232
Noncontrolling interests	—	—	1,592	—	1,592
Total equity	6,232	595,498	139,282	(733,188)	7,824
Total liabilities and equity	$ 875,213	$ 700,677	$165,901	$(1,449,239)	$ 292,552

Income Statement	ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Consolidating Adjustments	Total Consolidated
	Year Ended December 31, 2019				
			(In thousands)		
Total net revenues	$ —	$ 90,526	$84,153	$ —	$174,679
Cost of goods sold	—	86,531	28,126	—	114,657
Gross profit	—	3,995	56,027	—	60,022
Total operating expenses	37,293	32,435	14,753	—	84,481
Income (loss) from operations	(37,293)	(28,440)	41,274	—	(24,459)
Interest expense, net	(12,827)	(638)	391	—	(13,074)
Intercompany interest, net	513	(1,423)	910	—	—
Equity in earnings (losses) of investments	1,464	35,950	—	(37,414)	—
Other expense	(12)	(407)	(1,198)	—	(1,617)
Income (loss) before income taxes	(48,155)	5,042	41,377	(37,414)	(39,150)
Income tax expense (benefit)	44	(1,060)	9,080	—	8,064
Net income (loss)	(48,199)	6,102	32,297	(37,414)	(47,214)
Net income attributable to noncontrolling interests	—	—	(985)	—	(985)
Net income (loss) attributable to ION	$(48,199)	$ 6,102	$31,312	$(37,414)	$(48,199)
Comprehensive net income (loss)	$(47,075)	$ 6,059	$32,413	$(37,487)	$(46,090)
Comprehensive income attributable to noncontrolling interest	—	—	(985)	—	(985)
Comprehensive net income (loss) attributable to ION	$(47,075)	$ 6,059	$31,428	$(37,487)	$(47,075)

Income Statement	ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Consolidating Adjustments	Total Consolidated
	Year Ended December 31, 2018				
			(In thousands)		
Total net revenues	$ —	$ 96,649	$83,396	$ —	$180,045
Cost of goods sold	—	85,186	35,239	—	120,425
Gross profit	—	11,463	48,157	—	59,620
Total operating expenses	32,888	29,235	51,769	—	113,892
Loss from operations	(32,888)	(17,772)	(3,612)	—	(54,272)
Interest expense, net	(13,010)	(136)	174	—	(12,972)
Intercompany interest, net	1,124	(12,137)	11,013	—	—
Equity in earnings (losses) of investments	(26,446)	37,219	—	(10,773)	—
Other income (expense)	(196)	116	(356)	—	(436)
Income (loss) before income taxes	(71,416)	7,290	7,219	(10,773)	(67,680)
Income tax expense (benefit)	(245)	(6,711)	9,674		2,718
Net income (loss)	(71,171)	14,001	(2,455)	(10,773)	(70,398)
Net income attributable to noncontrolling interests	—	—	(773)	—	(773)
Net income (loss) attributable to ION	$(71,171)	$ 14,001	$ (3,228)	$(10,773)	$ (71,171)
Comprehensive net income (loss)	$(72,734)	$ 13,953	$ (4,797)	$ (8,383)	$ (71,961)
Comprehensive income attributable to noncontrolling interest	—	—	(773)	—	(773)
Comprehensive net income (loss) attributable to ION	$(72,734)	$ 13,953	$ (5,570)	$ (8,383)	$ (72,734)

Income Statement	Year Ended December 31, 2017 ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Consolidating Adjustments	Total Consolidated
			(In thousands)		
Total net revenues	$ —	$148,590	$48,964	$ —	$197,554
Cost of goods sold	—	90,754	31,161	—	121,915
Gross profit	—	57,836	17,803	—	75,639
Total operating expenses	39,000	28,020	17,318	—	84,338
Income (loss) from operations	(39,000)	29,816	485	—	(8,699)
Interest expense, net	(16,729)	(107)	127	—	(16,709)
Intercompany interest, net	1,084	(6,613)	5,529	—	—
Equity in earnings (losses) of investments	27,696	67,290	—	(94,986)	—
Other income (expense)	(4,610)	(407)	1,072	—	(3,945)
Income (loss) before income taxes	(31,559)	89,979	7,213	(94,986)	(29,353)
Income tax expense (benefit)	(1,317)	(1,427)	2,768	—	24
Net income (loss)	(30,242)	91,406	4,445	(94,986)	(29,377)
Net income attributable to noncontrolling interests	—	—	(865)	—	(865)
Net income (loss) attributable to ION	$(30,242)	$ 91,406	$ 3,580	$(94,986)	$(30,242)
Comprehensive net income (loss)	$(27,373)	$ 91,358	$ 6,550	$(97,043)	$(26,508)
Comprehensive income attributable to noncontrolling interest	—	—	(865)	—	(865)
Comprehensive net income (loss) attributable to ION	$(27,373)	$ 91,358	$ 5,685	$(97,043)	$(27,373)

Statement of Cash Flows	ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Total Consolidated
	Year Ended December 31, 2019 (In thousands)			
Cash flows from operating activities:				
Net cash provided by operating activities	$ 10,342	$ 14,642	$ 9,166	$ 34,150
Cash flows from investing activities:				
Investment in multi-client data library	—	(18,765)	(10,039)	(28,804)
Purchase of property, plant and equipment	(375)	(909)	(1,127)	(2,411)
Net cash used in investing activities	(375)	(19,674)	(11,166)	(31,215)
Cash flows from financing activities:				
Borrowings under revolving line of credit	40,000	—	—	40,000
Repayments under revolving line of credit	(40,000)	—	—	(40,000)
Payments on notes payable and long-term debt	(1,069)	(1,484)	—	(2,553)
Intercompany lending	(13,511)	6,495	7,016	—
Proceeds from employee stock purchases and exercise of stock options	141	—	—	141
Other financing activities	(1,134)	—	—	(1,134)
Net cash provided by (used in) financing activities	(15,573)	5,011	7,016	(3,546)
Effect of change in foreign currency exchange rates on cash, cash equivalents and restricted cash	—	—	(125)	(125)
Net increase (decrease) in cash and cash equivalents	(5,606)	(21)	4,891	(736)
Cash, cash equivalents and restricted cash at beginning of period	14,085	47	19,722	33,854
Cash, cash equivalents and restricted cash at end of period	$ 8,479	$ 26	$ 24,613	$ 33,118

The following table is a reconciliation of cash, cash equivalents and restricted cash:

	ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Total Consolidated
	December 31, 2019 (In thousands)			
Cash and cash equivalents	$8,426	$26	$24,613	$33,065
Restricted cash included in prepaid expenses and other current assets	53	—	—	53
Total cash, cash equivalents, and restricted cash shown in statements of cash flows	$8,479	$26	$24,613	$33,118

Statement of Cash Flows	ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Total Consolidated
	Year Ended December 31, 2018 (In thousands)			
Cash flows from operating activities:				
Net cash provided by (used in) operating activities	$(37,659)	$ 39,407	$ 5,350	$ 7,098
Cash flows from investing activities:				
Investment in multi-client data library	—	(25,307)	(2,969)	(28,276)
Purchase of property, plant and equipment	(392)	(959)	(163)	(1,514)
Net cash used in investing activities	(392)	(26,266)	(3,132)	(29,790)
Cash flows from financing activities:				
Repayments under revolving line of credit	(10,000)	—	—	(10,000)
Payments on notes payable and long-term debt	(30,169)	(638)	—	(30,807)
Cost associated with issuance of debt	(1,247)	—	—	(1,247)
Intercompany lending	7,983	(12,522)	4,539	—
Net proceeds from issuance of stocks	46,999	—	—	46,999
Proceeds from employee stock purchases and exercise of stock options	214	—	—	214
Other financing activities	(1,351)	—	—	(1,351)
Net cash provided by (used in) financing activities	12,429	(13,160)	4,539	3,808
Effect of change in foreign currency exchange rates on cash, cash equivalents and restricted cash	—	—	319	319
Net increase (decrease) in cash and cash equivalents	(25,622)	(19)	7,076	(18,565)
Cash, cash equivalents and restricted cash at beginning of period	39,707	66	12,646	52,419
Cash, cash equivalents and restricted cash at end of period	$ 14,085	$ 47	$19,722	$ 33,854

The following table is a reconciliation of cash, cash equivalents and restricted cash:

	ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Total Consolidated
	December 31, 2018 (In thousands)			
Cash and cash equivalents	$13,782	$47	$19,722	$33,551
Restricted cash included in other long-term assets	303	—	—	303
Total cash, cash equivalents, and restricted cash shown in statements of cash flows	$14,085	$47	$19,722	$33,854

Statement of Cash Flows	Year Ended December 31, 2017			
	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	$(22,315)	$ 73,154	$(23,227)	$ 27,612
Cash flows from investing activities:				
Investment in multi-client data library	—	(23,710)	—	(23,710)
Purchase of property, plant and equipment	(165)	(817)	(81)	(1,063)
Proceeds from sale of a cost-method investment	—	—	—	—
Net cash used in investing activities	(165)	(24,527)	(81)	(24,773)
Cash flows from financing activities:				
Payments on notes payable and long-term debt	(1,591)	(3,167)	(58)	(4,816)
Cost associated with issuance of debt	(53)	—	—	(53)
Intercompany lending	38,732	(45,609)	6,877	—
Proceeds from employee stock purchases and exercise of stock options	1,619	—	—	1,619
Other financing activities	(343)	—	—	(343)
Net cash provided by (used in) financing activities	38,364	(48,776)	6,819	(3,593)
Effect of change in foreign currency exchange rates on cash, cash equivalents and restricted cash	—	—	(260)	(260)
Net increase (decrease) in cash and cash equivalents	15,884	(149)	(16,749)	(1,014)
Cash, cash equivalents and restricted cash at beginning of period	23,823	215	29,395	53,433
Cash, cash equivalents and restricted cash at end of period	$ 39,707	$ 66	$ 12,646	$ 52,419

The following table is a reconciliation of cash, cash equivalents and restricted cash:

	December 31, 2017			
	ION Geophysical Corporation	The Guarantors	All Other Subsidiaries	Total Consolidated
	(In thousands)			
Cash and cash equivalents	$39,344	$66	$12,646	$52,056
Restricted cash included in prepaid expenses and other current assets	60	—	—	60
Restricted cash included in other long-term assets	303	—	—	303
Total cash, cash equivalents, and restricted cash shown in statements of cash flows	$39,707	$66	$12,646	$52,419

SCHEDULE II
ION GEOPHYSICAL CORPORATION AND SUBSIDIARIES
VALUATION AND QUALIFYING ACCOUNTS

Year Ended December 31, 2017	Balance at Beginning of Year	Charged (Credited) to Costs and Expenses	Deductions	Balance at End of Year
		(In thousands)		
Allowances for doubtful accounts	$ 1,443	$ 949	$(1,820)	$ 572
Allowances for doubtful notes receivable	4,000	—	—	4,000
Valuation allowance on deferred tax assets	217,589	(64,126)	—	153,463
Excess and obsolete inventory	15,049	398	(408)	15,039

Year Ended December 31, 2018	Balance at Beginning of Year	Charged (Credited) to Costs and Expenses	Deductions	Balance at End of Year
		(In thousands)		
Allowances for doubtful accounts	$ 572	$ 222	$(364)	$ 430
Allowances for doubtful notes receivable	4,000	—	—	4,000
Valuation allowance on deferred tax assets	153,463	7,042	—	160,505
Excess and obsolete inventory	15,039	665	(680)	15,024

Year Ended December 31, 2019	Balance at Beginning of Year	Charged (Credited) to Costs and Expenses	Deductions	Balance at End of Year
		(In thousands)		
Allowances for doubtful accounts	$ 430	$ —	$ (430)	$ —
Allowances for doubtful notes receivable	4,000	—	—	4,000
Valuation allowance on deferred tax assets	160,505	10,432	—	170,937
Excess and obsolete inventory	15,024	517	(2,208)	13,333

CORPORATE INFORMATION

EXECUTIVE OFFICERS

Christopher T. Usher
President and Chief Executive Officer

Michael L. Morrison
Executive Vice President
and Chief Financial Officer

Dale J. Lambert
Executive Vice President,
Operations Optimization

Matthew Powers
Executive Vice President, General Counsel
and Corporate Secretary

Kenneth G. Williamson
Executive Vice President and Chief Operating
Officer, E&P Technology & Services

Lisa M. Ruiz
Senior Vice President,
Global Human Resources

BOARD OF DIRECTORS

James M. (Jay) Lapeyre, Jr.
Chairman of the Board,
President, Laitram, L.L.C.

David H. Barr
Former President and Chief Executive Officer,
Logan International Inc.

Michael Y. McGovern
Chairman and CEO,
Sherwood Energy, LLC

S. James Nelson, Jr.
Former Vice Chairman,
Cal Dive International, Inc.
(now Helix Energy Solutions Group, Inc.)

John N. Seitz
Chairman and Chief Executive Officer,
GulfSlope Energy, Inc.

Christopher T. Usher
President and Chief Executive Officer,
ION Geophysical Corporation

Tina L. Wininger
Controller,
Next Wave Energy Partners

HuaSheng Zheng
Executive Vice President, BGP Inc.,
China National Petroleum Corporation

INVESTOR RELATIONS

Stockholders, securities analysts, portfolio managers, or brokers seeking information about the Company are welcome to call Investor Relations at +1 281 933 3339. If you prefer, you may send your requests to the Investor Relations e-mail address: ir@iongeo.com. Recent news releases, financial information, and SEC filings can be downloaded from the Company's website at iongeo.com.

ANNUAL REPORT ON FORM 10-K

ION Geophysical Corporation's Annual Report on Form 10-K for the fiscal year ended December 31, 2019, which is furnished as part of this Annual Report to Shareholders, is also available upon request without charge from: ION Geophysical Corporation, Attn: Investor Relations, 2105 CityWest Blvd., Suite 100, Houston, Texas 77042-2855.

ANNUAL MEETING

The Annual Meeting of Stockholders of ION Geophysical Corporation will be held at the offices of the Company located at 2105 CityWest Blvd., Suite 100, Houston, TX, 77042 on May 26, 2020, at 10:30 AM CST.

SPECIAL NOTE REGARDING POTENTIAL CHANGES TO OUR MEETING: Although we intend to hold our annual meeting in person, we are sensitive to concerns our shareholders may have, and recommendations that public health officials may issue, in light of the coronavirus (COVID-19) pandemic. Accordingly, we may impose additional procedures or limitations on meeting attendees or may decide to hold the meeting in a different location or solely by means of remote communication (i.e., a virtual-only meeting). We plan to announce this decision in advance and details will be posted on our website, and filed with the SEC. We encourage you to check our website (www.iongeo.com under "Investors—Investor Materials—Annual Report & Proxy Statement) prior to the meeting if you plan to attend.

STOCK TRANSFER AGENT

Computershare Investor Services
462 South 4th Street, Suite 1600
Louisville, KY 40202

INDEPENDENT AUDITORS

Grant Thornton LLP
700 Milam St., Suite 300
Houston, TX 77002
832 476 3600

CEO AND CFO CERTIFICATES

The Company has included as Exhibit 31.1 and 31.2 to its Annual Report on Form 10-K for the fiscal year ended December 31, 2019, filed with the Securities and Exchange Commission, certificates of the Chief Executive Officer and Chief Financial Officer of the Company certifying the quality of the Company's public disclosure and the Company has submitted to the New York Stock Exchange a certificate of the Chief Executive Officer of the Company certifying that he is not aware of any violation by the Company of the New York Stock Exchange corporate governance listing standards.

FORWARD-LOOKING STATEMENTS

This Annual Report to Stockholders 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 comparable terminology. Examples of other forward-looking statements contained or incorporated by reference in this Annual Report to Stockholders include statements regarding the COVID-19 pandemic; 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; agreements made or adhered to by members of OPEC and other oil producing countries to maintain production levels; 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; 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 laws or regulations pertaining to the oil and gas industry, including trade restrictions, embargoes and sanctions imposed by the U.S. government; future government actions that may result in the deprivation of our contractual rights, including the potential for adverse decisions by judicial or administrative bodies in foreign countries with unpredictable or corrupt judicial systems; expected net revenues, income from operations and net income; expected gross margins for our services and products; 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; expectations regarding the impact of the U.S. Tax Cuts and Jobs Act; 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. Information regarding factors that may cause actual results to vary from our expectations, referred to as "risk factors," appears in our Annual Report on Form 10-K for the fiscal year ended December 31, 2019 in Part I, Item 1A. "Risk Factors" and in other documents that we file from time to time with the Securities and Exchange Commission.

ION Geophysical Corporation | 2105 CityWest Blvd., Suite 100 | Houston, TX 77042 USA | +1 281 933 3339 | iongeo.com