



ANNUAL INFORMATION FORM

For the Fiscal Year Ended December 31, 2019

DATED March 18, 2020



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GENERAL MATTERS AND FORWARD-LOOKING STATEMENTS

Information contained in this Annual Information Form (“AIF”) is provided as at December 31, 2019, unless otherwise specified. Unless the context otherwise requires, all references in this AIF to “Photon Control”, “we”, “us”, “our” and the “Company” refer to Photon Control Inc. and its subsidiaries. In this AIF, references to “\$”, “Cdn\$”, “dollars” or “Canadian dollars” are to Canadian dollars. Unless otherwise indicated, all dollar amounts are expressed in Canadian dollars.

This AIF is prepared as of March 18, 2020. You should read this AIF in conjunction with our audited consolidated financial statements for the year ended December 31, 2019 and the management’s discussion and analysis for the three months and year ended December 31, 2019. Additional information about the Company is available on SEDAR at www.sedar.com.

Forward-Looking Statements

This AIF contains certain statements and information that are not based on historical facts and constitute forward-looking statements or forward-looking information within the meaning of Canadian securities laws (collectively, “**forward-looking statements**”), including our business outlook for the short and longer-term and statements regarding our strategy, plans and future operating performance. Forward-looking statements are provided to help you understand our views of our short and longer-term plans, expectations and prospects. We caution you that forward-looking statements may not be appropriate for other purposes.

Any statements that express or involve discussions with respect to predictions, expectations, beliefs, plans, projections, objectives, assumptions or future events or performance (often, but not always, identified by words or phrases such as “expects”, “is expected”, “anticipates”, “believes”, “plans”, “projects”, “estimates”, “assumes”, “intends”, “strategy”, “goals”, “objectives”, “potential”, “possible” or variations thereof or stating that certain actions, events, conditions or results “may”, “could”, “would”, “should”, “might” or “will” be taken, occur or be achieved, or the negative of any of these terms and similar expressions) are not statements of historical fact and may be forward-looking statements. Forward-looking statements are not promises or guarantees of future performance; they represent our current views and may change significantly. Forward-looking statements are based on a number of material assumptions, including, but not limited to, those listed below, which could prove to be significantly incorrect:

- our ability to develop, manufacture and sell new products that meet the needs of our customers and gain commercial acceptance;
- our ability to continue to sell our products in line with expected quantity, price and delivery times;
- our ability to attract new business;
- continued and future demand for the Company’s products;
- continued sales to the Company’s major customers;
- our operations not being adversely affected by supply, operating, cyber security, litigation or regulatory risks;
- our ability to react to the cyclical nature of the semiconductor industry;
- our ability to enhance revenue diversification and open new market opportunities; and
- our expectations regarding market risk, including interest rate changes, tax changes and foreign currency fluctuations.

The forward-looking statements included in this report include, without limitation, statements relating to:

- factors that we expect to drive continued demand for the Company’s products;
- expected growth within the semiconductor industry and the Company’s reliance on the financial health of the semiconductor industry from which it derives its sales;
- the market for the Company’s products;
- sources of our revenues from operations in the future;
- continued international expansion and the effect of such expansion on our operations;

- potential acquisitions in the future and the effect of such acquisitions on our operations;
- fluctuation of the price of the Common Shares (as defined below) in the future;
- potential inability of investors to sell their Common Shares;
- our future performance being dependent on our ability to hire and retain qualified personnel; and
- the Company is not anticipating paying any dividends in the foreseeable future.

Forward-looking statements involve known and unknown risks, uncertainties and other factors which may cause the actual results, performance or achievements of the Company to be materially different from any results, performance or achievements expressed or implied by the forward-looking statements. Such uncertainties and factors include, among others:

- risks associated with the Company's ability to retain its major customers;
- risks associated with a lengthy sales cycle;
- risks related to our dependency on the semiconductor industry and our ability to respond to industry cyclicality;
- risks associated with the Company's ability to expand its manufacturing capacity or reduce costs in response to rapid shifts in demand for the Company's products;
- risks associated with continuous technological change, evolving industry standards, shifting customer needs and new product introductions and enhancements;
- risks associated with failure to operate our business in accordance with our business plan;
- uncertainty relating to the timing of product development and commercial launch;
- risks associated with competition;
- operational risks associated with manufacturing and our dependence on sole or limited source suppliers;
- risks associated with compliance with customers' requirements;
- uncertainty relating to operating results;
- risks related to legal, regulatory and tax environments in which we conduct our business;
- risks associated with product liability claims;
- risks related to product pricing;
- risks related to inability to use or access information systems, or related to breaches of our network security;
- risks associated with manufacturing interruptions or delays;
- risks relating to legal proceedings and with the Company's intellectual property;
- risks associated with infringing on the intellectual property rights of others;
- uncertainty relating to general economic conditions;
- risks related to tariffs or other trade restrictions;
- risks related to future mergers or acquisitions;
- uncertainty related to international operations, including currency fluctuations, additional development projects, other business opportunities and disruption due to the spread of the COVID-19 virus;
- risks associated with the adverse impact of climate change;
- risks related to the volatility of the trading price and volume of the Common Shares;
- risks associated with maintaining an active market for the Common Shares;
- risks associated with our directors and officers;
- risks associated with attracting and retaining qualified personnel; and

- risks associated with compliance with various federal, provincial, local and international laws governing the environment.

This list is not exhaustive of the factors that may affect any of our forward-looking statements. Forward-looking statements are statements about the future and are inherently uncertain, and our actual achievements or other future events or conditions may differ materially from those reflected in the forward-looking statements due to a variety of risks, uncertainties and other factors, including, without limitation, those referred to in this report under the heading “Risk Factors”.

The Company’s forward-looking statements are based on beliefs, expectations and opinions of management on the date the statements are made. For the reasons set forth above, readers should not place undue reliance on forward-looking statements. The Company undertakes no obligation to update or revise any forward-looking statements included herein if these beliefs, estimates and opinions or other circumstances should change, except as otherwise required by applicable law.

CORPORATE STRUCTURE

Photon Control was incorporated under the *Company Act* (British Columbia) on September 6, 1988 under the name “CST Coldswitch Technologies Inc.” The Company changed its name to “Coldswitch Technologies Inc.” on July 4, 2001 and to “Photon Control Inc.” on August 9, 2002. On June 22, 2005, the Company transitioned under the *Business Corporations Act* (British Columbia).

The Company has the following five wholly-owned subsidiaries:

Name	Jurisdiction of Incorporation	Status
Photon Control (USA) Inc.	Delaware	Active
LAI Lightwave Aerospace Industries Ltd.	British Columbia	Inactive
CST Coldswitch Holdings Inc.	British Columbia	Inactive
The LightSwitch Company Inc.	Canada	Inactive
Photon Control (Alberta) Inc.	Alberta	Inactive

The Company’s registered and records office is located at Suite 2600, Three Bentall Centre, 595 Burrard Street, PO Box 49314, Vancouver, British Columbia, Canada, V7X 1L3 and its head office and principal place of business is located at 130 - 13500 Verdun Place, Richmond, British Columbia, V6V 1V2.

GENERAL DEVELOPMENT OF THE BUSINESS

Photon Control designs, manufactures and distributes a wide range of optical sensors and systems to measure temperature and position. These products are used by the world’s largest Wafer Fabrication Equipment (“WFE”) manufacturers and end users in the semiconductor and solid-state industries. Photon Control’s high quality products provide industry-leading accuracy, speed and quality in the most extreme conditions and are backed by a team of experts providing a variety of on-site and remote services including custom design, installation, training and support. The Company is headquartered in an ISO 9001:2015 manufacturing facility in Vancouver, British Columbia (“BC”), Canada, has a sales and engineering office in San Jose, California and a sales distribution network across Asia.

Recent Developments

On January 14, 2020, the Company announced it successfully completed a surveillance audit of its quality management system to maintain its ISO 9001:2015 certification.

Three Year History

2019

On January 4, 2019, the Company commenced a normal course issuer bid (the “2019 NCIB”) to acquire up to 5,490,000 common shares in the capital of the Company (“Common Shares”), which expired on January 3, 2020. Under the 2019 NCIB, the Company purchased for cancellation a total of 5,490,000 Common Shares at a volume

weighted average price of \$1.29 through the facilities of the Toronto Stock Exchange (the “TSX”) and other Canadian marketplaces.

On January 10, 2019, the Company announced a distribution agreement with Japan Laser Corporation (“JLC”), a leading distributor of lasers and other optical equipment in Japan. JLC will distribute Photon Control’s fiber optic temperature and position sensors used for advanced process monitoring by the world’s largest wafer fabrication equipment manufacturers.

On January 31, 2019, the Company announced the opening of a new office in San Jose, California. The office will facilitate continued growth in the Company’s engineering, sales and marketing teams, and further strengthen Photon Control’s partnerships with some of its largest customers.

On April 12, 2019, the Company announced the appointment of Nigel Hunton as its President, Chief Executive Officer (“CEO”) and as a director effective May 2, 2019.

On August 15, 2019, the Company announced that one of its Materials Engineers was scheduled to speak at Copper 2019, as part of the Annual Conference of Metallurgists, which demonstrates Photon Control’s culture of innovation, collaboration and thought leadership.

On October 16, 2019, the Company announced that Photon Control was named as a finalist of Business in Vancouver’s 2019 BC Export Awards in the Advancing Technology and Innovation category. The BC Export Awards are the province’s most prestigious awards paying tribute to the success and innovative approaches of BC export companies.

On December 16, 2019, the Company announced an expansion of its addressable market with a new product launched by Union Medical Co. Ltd. (“**Union Medical**”), a major Korean manufacturer producing laser, electrosurgical and other aesthetic equipment. The Company’s optical sensors and systems have been designed into Union Medical’s high-frequency hyperthermia cancer treatment medical device, Neo Thermos, which is used to treat tumors without affecting normal cells. Photon Control’s temperature sensor systems are used to monitor the patient’s temperature during the treatment, and its fiber optic technology is immune to the radio frequency generated from the device.

2018

In January 2018, the Company received the ISO 9001:2015 certification for its quality management system.

On January 4, 2018, the Company commenced a normal course issuer bid (the “**2018 NCIB**”) to acquire up to 5,500,000 Common Shares, which expired on January 3, 2019. Under the 2018 NCIB, the Company purchased for cancellation a total of 1,633,225 Common Shares at a volume weighted average price of \$1.84 through the facilities of the TSX and other Canadian marketplaces.

On January 25, 2018, the Company announced the release of a four-channel temperature converter. This multi-channel system is a single electronic enclosure with four channels which reduces the space required for temperature sensing systems. These converters are designed and developed specifically to meet the demanding and stringent requirements of high radio frequency semiconductor process control applications.

On January 31, 2018, the Company entered into a letter of intent with King’s Energy Inc. (the “**OFM Transaction**”) to sell all the assets and rights associated with the Company’s Optical Flow Meter product. On February 15, 2018, the Company completed the OFM Transaction for minimum gross proceeds of \$0.4 million.

On March 1, 2018, the Company announced the release of wider temperature ranges of its fiber optic temperature probes. The new wider temperature ranges are for both contact and immersion temperature probe product lines. The contact temperature probes can now measure ranges from -95°C to 400°C and the immersion temperature probes can now measure ranges from -95°C to 300°C.

On April 5, 2018, the Company accepted the resignation of MNP LLP as the Company’s auditor and appointed KPMG LLP as its new auditor.

On May 25, 2018, the Company transitioned to the TSX from the TSX Venture Exchange (the “**TSXV**”).

On July 30, 2018, the Company announced an exclusive distribution agreement with Crowntech Photonics, a leading manufacturer and distributor of integrated fiber optic modules for the data communication and telecommunication industries in China.

On September 27, 2018, the Company announced the introduction of a Rapid Prototyping program for its fiber optic sensor product lines. The new program reduces lead-times for producing prototype sensors to an industry best of four to six weeks, a reduction of over 40% from current lead-times. The program has been successfully

demonstrated on several fiber optic temperature sensors for top-tier WFE suppliers, with the prototypes delivered ahead of plan.

On October 11, 2018, the Company announced it had transitioned three new products to the final pre-production release step in its New Product Introduction process. The new fiber optic products included a new real-time wafer position sensor, a temperature sensor with improved accuracy and manufacturing robustness, and an offline wafer position sensor. These new products have been developed for deployment in the etch and deposition steps with existing customers. The pre-production release step is the final approval stage prior to production release for new products and indicates that the customer has approved the final design of prototypes delivered after the proof-of-concept and in-house validation phases.

On November 29, 2018, the Company announced the upcoming prototype release of its new multi-channel analyzer (the “**MC5**”) for the first quarter of 2019. The MC5 will be the first product to be released from Photon Control’s new family of analyzers. The MC5 analyzes the optical signal from up to five phosphor-based fiber optic temperature probes simultaneously, thereby reducing customer costs and its form factor compared to the equivalent number of single channel units. The MC5 has been selected for prototype development with a leading WFE supplier for process monitoring in their next generation plasma etch tool.

On December 3, 2018, the Company announced certain changes to its Board of Directors (the “**Board**”) and management team. D. Neil McDonnell, Director and Chair of the Board (“**Chair**”), was appointed as Interim CEO, and Ronan McGrath, Chair of the Audit Committee, was appointed as Lead Independent Director. Scott Edmonds departed from the Company and his roles as a director, President and CEO.

2017

On January 4, 2017, the Company commenced a normal course issuer bid (the “**2017 NCIB**”) to acquire up to 5,400,000 Common Shares, which expired on January 3, 2018. Under the 2017 NCIB, the Company purchased for cancellation a total of 579,800 Common Shares at market prices ranging from \$1.01 to \$1.10 per Common Share through the facilities of the TSXV.

On January 13, 2017, the Company announced the appointment of D. Neil McDonnell as Chair of the Board of Directors of the Company.

On March 31, 2017, the Company announced certain changes to the Board and management team. Charles Cargile was appointed as a director and Scott Edmonds was appointed as President, CEO and as a director. Michael W. Goldstein resigned as Interim CEO and as a director of the Company, while Robert B. Breault and Joseph Litner resigned from the Board.

In April 2017, the Company announced the settlement of its outstanding litigation with Photon Control R&D Ltd. (“**Photon R&D**”) and the entry into a settlement agreement with Photon R&D (“**Settlement Agreement**”). Pursuant to the terms of the Settlement Agreement, Photon Control acquired full ownership of all intellectual property, products, trademarks and other assets under dispute that were previously owned by Photon R&D, Photon R&D employees were transferred to and hired by Photon Control, Photon Control agreed to pay a certain percentage of its revenues for five years to certain former owners of Photon R&D and the parties agreed to settle all outstanding legal disputes.

In May 2017, the Company moved into its new state-of-the-art manufacturing facility, significantly increasing its production capacity for continued growth.

On July 17, 2017, the Company announced the appointment of Daniel Lee as Chief Financial Officer (“**CFO**”).

On July 27, 2017, the Company received \$0.6 million of funds previously held in escrow by the Supreme Court of British Columbia in conjunction with the litigation with Photon R&D.

On September 14, 2017, the Company announced the achievement of customer certification and successful completion of the Company’s relocation to its newly designed manufacturing facility in Richmond, BC, Canada. The Company completed all of the stringent customer audits and assessments along with all critical design reviews to meet the semiconductor industry standards of “copy exact” requirements. The Company achieved full certification expected from its semiconductor customers to manufacture and ship products from the new manufacturing facility.

On October 23, 2017, the Company announced the appointment of Michele Klein as a director.

NARRATIVE DESCRIPTION OF THE BUSINESS

Photon Control is the leading developer and supplier of optical sensor temperature and position measurement systems to the WFE Original Equipment Manufacturer (“OEM”) industry. Photon Control’s products are designed to perform in extreme conditions and are supported by a team of experts that offers custom design, rapid prototyping, on-site installation, training and support. Photon Control also provides engineering services for customized optical measurement systems.

Products and Industries

Semiconductor Industry: Temperature and Position Sensors

The semiconductor capital equipment industry offers several significant and growing applications for our technology and is the primary source of revenue for our business. The Company designs and produces precision temperature and position sensors used by semiconductor WFE manufacturers in our ISO-certified manufacturing facility. The manufacturing of silicon wafers for semiconductors involves a multitude of complex processes; monitoring and maintaining the correct wafer position and wafer temperature during these processes is critical to achieving the product yield and productivity required for high-volume manufacturing. The measurement accuracies required of such sensors are becoming more challenging as semiconductor devices scale to atomic level dimensions and become more three-dimensional (“3D”) in nature. Furthermore, these sensors must maintain their accuracy in harsh environments encountered in critical semiconductor equipment, such as the strong radio frequency electromagnetic fields encountered in plasma etch and plasma-assisted deposition systems. Photon Control’s fiber optic sensors are immune to radio frequency interference and are thus able to deliver the high accuracies required for state-of-the-art process control.

The need for scaling semiconductor devices to atomic level dimensions has also created a need for more measurement points inside the chamber. Temperature and position anomalies have a greater impact on yield at these atomic level dimensions and must be measured and controlled more precisely, which increases the value and use of fiber optic sensors. In addition, as semiconductor equipment has gone from 28 nm node to sub-10 nm nodes, the number of measurement points and etch steps has increased more than four-fold. Similarly, the proliferation of 3D and advanced logic chip designs have become more common and comprise an increasingly significant percentage of total chips manufactured. These factors have driven and are expected to continue to drive demand for the Company’s products.

Sales, Marketing and Distribution

Photon Control sells its products globally with sales to OEMs primarily in the United States who in turn sell their products to semiconductor manufacturers in the United States, Asia and Europe. We also sell through a network of distributors in Asia who sells our products to OEMs in their home markets.

Revenue for the financial year ended December 31, 2019 was \$32.7 million representing a decrease of \$14.0 million or 30% compared to \$46.7 million reported in 2018. The decrease in reported revenue for the year was due to the semiconductor cycle, where wafer fabrication equipment spending in 2019 was delayed following a prolonged multi-year period of growth.

Market Landscape

In addition to the increasing number of measurement points, there are several other market and technology trends that we expect will contribute to the fiber optic sensor market in semiconductor manufacturing:

- Semiconductors have revolutionized all aspects of our economy and lives - among the technologies fueled by semiconductors today and in the future are smartphones, 5G mobile, the cloud, autonomous driving, and artificial intelligence. As a critical building block of these technologies, semiconductors will continue to enable innovation and transform industries, and hence, chip makers are expected to increase production to meet this growing market.
- The need for more storage capacity and computing power also continues to drive the scaling of semiconductor devices to smaller dimensions and to be more “3D”. These advanced technologies are more complex which require more process steps, equipment and sensors.
- The scaling of semiconductor devices requires patterning of semiconductor materials at atomic level dimensions. This is achieved by a process called “multi-patterning” which requires extra plasma etch and deposition steps compared to standard patterning, and these equipment segments have been outpacing the overall WFE market. The Company’s fiber optic sensors are used mostly in plasma etch and deposition equipment.
- The semiconductor capital equipment market has historically experienced certain cycles of growth and contraction due to variations in product supply and demand, changing customer requirements and rapid technological change. The Company has identified a number of non-semiconductor market segments as potential targets for its fiber optic sensing products to diversify its revenue stream in the future.

Production and Services

Photon Control uses a variety of assembly and test techniques in the production of its temperature and position sensors, both in-house and outsourced to contract manufacturers. Methods include, but are not limited to, manual, fixtured and semi-automated component assembly using both mechanical and adhesive technologies, fabrication of machined and molded parts, printed circuit board assembly, and component assembly and test within an IPC Class 6 cleanroom environment. Additional testing methods range from in-circuit and functional to extreme environment temperature and position accuracy verification. Quality and specification inspection, using various gauge and material analysis equipment, is used in support of production. Services include design, analysis, reliability testing, repair, rework and upgrade support.

Specialized Skill and Knowledge

Due to the technical nature of its business and the dynamic market in which the Company competes, continued success depends on attracting and retaining highly skilled engineering, production, managerial, consulting, marketing and sales personnel. In particular, the Company’s future success depends in part on the continued services of key employees.

The engineering function requires specialized skill and knowledge, from academic and industry-related experience, for research, development and design of electronic, photonic and mechanical componentry and associated production assembly and test techniques. Production relies on technician skills and experience in several manual and semi-automated assembly and test techniques. Training programs develop and maintain those skills, whereby process documentation provides instructions on how to complete assembly and test operations. In some cases, techniques require formal training and certification such as hand soldering and fork-lift operation.

Competitive Conditions

The competitive conditions vary depending on the markets where the Company’s products are used. The Company competitively positions itself by highlighting its long history in the fiber optic industry, the accuracy of its products and well documented proof of this accuracy being sustainable, its products purchased and tested by some of the largest WFE manufacturers, the quality of its products, and the “Rapid Prototyping” capabilities of its new product introduction team when differentiating itself from its competitors.

The Company has perfected the use of phosphor-based fiber optic and other optical sensing technologies in harsh environments with high accuracy, rapid prototyping capabilities and “copy exact” manufacturing. Because of this, the Company is deeply embedded with the world’s largest WFE manufacturers with long product life cycles. The

long-standing partnerships with such WFE manufacturers are a key differentiating factor from other competing companies.

New Products

The semiconductor capital equipment industry is characterized by technological change and product development. Research and development activities require experience, innovation, long development cycles and strong financial resources. With the close relationships we have with our customers and our understanding of their current and future needs, we have invested in research and development activities for new and existing products to maintain our competitive position and to expand and diversify our target markets for fiber optic sensors. Even during down cycles in the semiconductor industry, we have remained committed to our research and development activities in order to increase our market position and grow faster than our peers.

Components

The Company follows a “copy exact” standard in providing its products to its customers and is required to maintain an adequate supply of inventory on hand to fulfill purchase orders from its customers. From our suppliers we require the timely delivery of raw materials, parts, components, and subassemblies which are manufactured to our specifications. Although we make reasonable efforts to ensure that these components and raw materials are available from multiple suppliers, this is not always possible, and certain components and raw materials included in our systems may be obtained only from a single supplier or a limited group of suppliers. As the timing and quantum of customer orders cannot be forecasted with complete accuracy, the Company’s inventory supply must be planned to protect against variation between the forecast and actual customer demand. Through our business continuity planning, we endeavor to minimize the risk of production interruption by, among other things, monitoring the financial condition of suppliers of key parts and raw materials, identifying (but not necessarily qualifying) possible alternative suppliers of such parts and materials, and ensuring adequate inventories of key components and raw materials are available to maintain manufacturing schedules.

Intellectual Property

Intellectual property rights are essential to us and our ability to compete effectively with other companies is dependent upon the proprietary nature of our technologies. We rely upon trade secrets, know-how, continuing technological innovations and licensing opportunities to develop, maintain and strengthen our competitive position. We require each of our employees, including our executive officers, to enter into standard agreements pursuant to which the employee agrees to keep confidential all of our proprietary information and to assign to us all inventions while they are employed by us. As the Company continues to expand its product offerings, the Company expects to continue to expand its intellectual property (including patents). Despite these efforts to protect the Company’s proprietary rights, unauthorized parties may attempt to copy or otherwise obtain the use of the Company’s products or technology that we consider proprietary and third parties may attempt to develop similar technology independently.

Although we consider patents and other intellectual property significant to our business, due to the rapid pace of innovation within our industry, we also believe that our protection through patent and other intellectual property rights is less important than factors such as our technological expertise, continuing development of new systems, market penetration, installed base and the ability to provide comprehensive support and service to customers worldwide.

Cycles

The semiconductor industry has historically experienced certain cycles of growth and contraction, and as the Company is a critical subsystems supplier to the capital equipment manufacturers in the semiconductor space, it is also subject to such cycles. The Company has identified a number of non-semiconductor market segments as potential targets for its fiber optic sensing products to diversify its revenue stream in the future.

Economic Dependence

The Company earned 80% of its revenues from its three largest customers in 2019, and while this does not create economic dependence on any individual customer, the loss of one would seriously impact the Company’s profitability in the near-term. Offsetting this risk is the long-term nature of the customers’ product line into which the Company’s products have been “designed in”. The nature of the “copy exact” standard to which all suppliers

in the semiconductor industry are subject means that it is difficult and time consuming for a customer to change suppliers. This remains a real risk but mitigates the concentration risks to which the Company is subject.

Employees

At December 31, 2019, the Company had 98 full-time equivalent employees, all of whom were located in North America. As of the date of this AIF, the Company had 103 full-time employees.

Foreign Operations

Photon Control sells its products globally with sales to OEMs in the United States, forming our largest market. Our customers in turn sell their products to semiconductor manufacturers in the United States, Asia and Europe. We also sell through a network of distributors in Asia who sells our products to OEMs in their home market. In February 2019, the Company opened an office in San Jose, California. The Silicon Valley office will facilitate continued growth in the Company's engineering, sales and marketing teams, and further strengthen Photon Control's partnerships with some of its largest customers.

The following table provides a summary of our revenues by territory:

Territories <i>Dollar values in thousands</i>	For the year ended December 31		Variance	
	2019	2018	(\$)	(%)
United States	\$20,788	\$26,285	(\$5,497)	(21%)
Asia	\$11,942	\$20,419	(\$8,477)	(42%)
Total	\$32,730	\$46,704	(\$13,974)	(30%)

For the year ended December 31, 2019, revenues earned in the United States and Asia decreased over the prior year due to inventory reduction strategies employed by our customers following reduced levels of semiconductor equipment capital spending.

Reorganizations

In 2008, the Company's engineering functions were outsourced to Photon R&D, a non-arm's length company controlled by the Company's then Chair and CEO, and the CEO's son. Soon thereafter the CEO of the Company resigned to become CEO of the non-arm's length company, and his son was appointed to replace him as CEO of the Company. This outsourcing arrangement was unwound in April 2017 with a litigation settlement with Photon R&D.

Other than the transactions described as part of the settlement with Photon R&D, the Company has not undertaken any reorganizations.

RISK FACTORS

Our business is subject to significant risks and uncertainties and past performance is no guarantee of future performance. The risks and uncertainties described below are those that we currently believe to be material, and do not represent all of the risks that we face. Additional risks and uncertainties, not presently known to us, may become material in the future or those risks that we currently believe to be immaterial may become material in the future. If any of the following risks actually occur, alone or in combination, our business, financial condition and results of operations, as well as the market price of the Common Shares, could be materially adversely affected.

We are exposed to risks associated with a highly concentrated customer base.

Our top three customers accounted for approximately 80% and 79% of our revenues for the years ending December 31, 2019 and 2018, respectively, and we generally have no long-term contracts with our customers requiring them to purchase any specified quantities from us. As a result, the actions of even a single customer can expose our business and results of operations to greater volatility. The mix and type of customers, and sales to any single customer, may vary significantly from quarter to quarter and from year to year, and have a significant impact on our business, financial condition and results of operations. If customers do not place orders, or they substantially reduce, delay or cancel orders, we may not be able to replace the business, which may have a significant adverse impact on our results of operations and financial condition. Major customers may also seek pricing, payment, intellectual property-related, or other commercial terms that are less favourable to us, which may

have a negative impact on our business, revenue and gross margins. The demand for our products from our customers depends on the cyclical nature of our served markets, specifically the semiconductor equipment market. Attempts to lessen the adverse effect of any loss or reduction of net revenues through the rapid addition of new customers could be difficult because a relatively small number of companies dominate the semiconductor equipment market. Further, prospective customers typically require lengthy qualification periods prior to placing volume orders with a new supplier.

Because our sales cycle is long and certain of our orders are subject to rescheduling or cancellation, we may experience fluctuations in our operating results.

Many of our products are complex and customers for these products require substantial time to qualify our products and make purchase decisions. These customers often perform, or require us to perform, extensive configuration, testing and evaluation of our products before committing to purchasing them, which can require a significant upfront investment by us. The sales cycle for these products from initial contact through shipment varies significantly, is difficult to predict and can last more than a year. If we fail to anticipate the likelihood, costs or timing associated with sales of these products, our business and results of operations would be negatively affected.

Our orders are generally subject to rescheduling without penalty or cancellation without penalty other than reimbursement for certain labour and material costs. We, from time to time, experience order rescheduling and cancellations, which can result in fluctuation of our operating results from period to period.

Our business depends on the semiconductor industry and our ability to respond to industry cyclicality.

As the Company is a critical subsystems supplier to the capital equipment manufacturers in the semiconductor industry, it is subject to unpredictable cycles of growth and contraction. During periods of rapid growth or decline in demand for our products, we face significant challenges in maintaining adequate financial and business controls, management processes, information systems, procedures for training and managing our workforce, and in appropriately sizing our supply chain infrastructure and facility, workforce, and other components of our business on a timely basis. If we do not adequately meet these challenges during periods of increasing or declining demand, our gross margins and earnings may be negatively impacted.

Our inability to expand or outsource our manufacturing capacity or reduce our fixed costs in response to rapid demand shifts may cause a reduction in our market share.

The semiconductor industry is subject to rapid increases and decreases in demand which are difficult to predict. Our ability to increase sales of certain products depends in part upon our ability to expand our manufacturing capacity for such products in a timely manner. If we are unable to expand our manufacturing capacity on a timely basis or to manage such expansion effectively, our customers could implement our competitors' products and, as a result, our market share could be reduced. Because the semiconductor industry is subject to rapid demand shifts, which are difficult to foresee, we may not be able to increase capacity quickly enough to respond to a rapid increase in demand. Additionally, capacity expansion could increase our fixed operating expenses and if sales levels do not increase to offset the additional expense levels associated with any such expansion, our business, financial condition and results of operations could be materially adversely affected. Our ability to rapidly and effectively reduce our cost structure in response to decreases in demand for our products is limited by the fixed nature of many of our expenses in the near-term. Additionally, our ability to reduce our long-term expenses is constrained by our need to continue our investment in next generation product technology.

Many of the markets and industries that we serve are subject to continuous technological change, and if we fail to introduce new and innovative products or improve our existing products, or if the adoption of our new products by customers is not successful, our business, financial condition and results of operations will be negatively affected.

Many of our markets are characterized by continuous technological advances, evolving industry standards, shifting customer needs, new product introductions and enhancements, and the periodic introduction of disruptive technology that displaces current technology due to a combination of price, performance and reliability. If our products are not designed into successive generations of our customers' products, we will lose significant revenues during the lifespan of those products. We depend, to a significant extent, upon our ability to enhance our existing products, to anticipate and address the demands of the marketplace for new and improved and disruptive technologies, through a variety of techniques including deep and regular engagement with our customers' engineering teams, internal development or by acquisitions, and by aiming to be price-competitive.

If we fail to operate our business in accordance with our business plan, our operating results, business and stock price may be significantly and adversely impacted.

We attempt to operate our business in accordance with a business plan that is established annually, revised frequently (generally quarterly), and reviewed by management even more frequently (at least monthly). Our business plan is developed based on a number of factors, many of which require estimates and assumptions, such as our expectations of the economic environment, future business levels, our customers' willingness and ability to place orders, lead-times, and future revenue and cash flow. Our budgeted operating expenses, for example, are based in part on our future revenue expectations. However, our ability to achieve our anticipated revenue levels is a function of numerous factors, including the volatile and historically cyclical nature of our primary industry, customer order cancellations, macroeconomic changes, operational matters regarding particular agreements, our ability to manage customer deliveries, delays or accelerations by customers in taking deliveries and the acceptance of our products (for products where customer acceptance is required before we can recognize revenue from such sales), our ability to operate our business and sales processes effectively, and a number of the other risk factors set forth in this section.

Delays in planned product introductions may adversely affect us and negatively impact future revenues.

We may in the future experience delays in various phases of product development and commercial launch, including during research and development, manufacturing, limited release testing, marketing and customer education efforts. Any delays in our product launches may significantly impede our ability to successfully compete in our markets and may reduce our revenues. We and our future collaborators may fail to develop or effectively commercialize products covered by our future collaborations if:

- we do not achieve its objectives under our collaboration agreements;
- we or our collaborators are unable to obtain patent protection for the products or proprietary technologies we develop with our collaborators; or
- we or our collaborators encounter regulatory hurdles that prevent commercialization of our products.

If we or our collaborators are unable to develop or commercialize products as planned, or if conflicts arise with our collaborators, we will be delayed or prevented from developing and commercializing products, which will negatively affect us and our financial results.

We operate in highly competitive industries.

The markets for our products are intensely competitive, and we believe that competition from both new and existing competitors will increase in the future. Principal competitive factors include: historical customer relationships, product quality, performance and price, breadth of product line, manufacturing capabilities, and customer service and support. Our competitive success often depends upon factors outside of our control.

Interruptions, delays or cost increases affecting our materials, parts, equipment or subcontractors, exacerbated by our dependence on sole or limited source suppliers, may impair our ability to manufacture products and our competitive position.

Our manufacturing operations depend upon us obtaining adequate supplies of materials, parts and equipment on a timely basis from third parties to meet the rapidly changing demands of our customers. Our ability to timely manufacture our products depends in part on the timely delivery of raw materials, parts, components, and subassemblies from suppliers. We rely on sole and limited source suppliers for some of our raw materials, parts, components, and subassemblies that are critical to the manufacturing of our products. Our results of operations could be adversely affected if we are unable to obtain adequate supplies of materials, parts and equipment in a timely manner, or if the costs of materials, parts or equipment increase significantly. Although we generally use materials, parts and equipment available from multiple suppliers, we have a limited number of suppliers for some materials, parts and equipment. While we believe that alternate suppliers for these materials, parts and equipment are available, an interruption or termination of supply sources could materially impair our operations.

From time to time, suppliers may extend lead-times, limit supplies or increase prices due to capacity constraints or other factors. If any such suppliers experience financial difficulties, we could be adversely affected. From time to time, our sole or limited source suppliers have given us notice that they are ending supply of critical parts, components, and subassemblies that are required for us to deliver product. If we cannot qualify alternative suppliers before ending supply of critical parts from sole or limited source suppliers, we may be required to make a last-time-buy(s) and take possession of material amounts of inventory in advance of customer demand. In some instances, the last-time-buy materials required to be purchased may be for several years which in turn exposes

us to additional excess and obsolescence risk. If we cannot qualify alternative suppliers before the last-time-buy materials are utilized in our products or legacy inverter warranty operations, we may be unable to deliver further product service to our customers.

If we or our suppliers fail to comply with customers' requirements, manufacturing of our products could be negatively impacted, and sales of our products could suffer.

Our manufacturing practices must be in compliance with customers' requirements, which govern the facility, methods, control procedures, records of design, manufacturing, packaging, labeling, storage, shipping, installation, and servicing of our products. If we or our suppliers fail to comply with such customers' requirements, our operations and financial results may be negatively impacted. Our products could contain defects, which would increase our costs and seriously harm our business, operating results, financial condition and customer relationships. Many of our products are inherently complex in design and, in some cases, require ongoing regular maintenance. Further, the manufacture of these products often involves a highly complex and precise process and the utilization of specially qualified components that conform to stringent specifications. As a result of the technical complexity of these products, design defects, changes in our or our suppliers' manufacturing processes or the inadvertent use of defective or nonconforming materials by us or our suppliers could adversely affect our manufacturing yields and product reliability. This could in turn negatively affect our business, operating results, financial condition and customer relationships.

Our operating results have fluctuated and will likely continue to fluctuate from quarter to quarter.

Our quarterly operating results have fluctuated in the past and will likely continue to vary from quarter to quarter. Some of the factors that may influence our operating results include the following: changes in customer demand; demand for products that use semiconductors; market acceptance of our products and those developed by our customers; competition; the timing, cancellation or delay of customer orders, shipments and acceptances; and product development costs, including increased research, development, engineering and marketing expenses associated with our introduction of new products and product enhancements.

We are exposed to various risks related to the legal, regulatory and tax environments in which we perform our operations and conduct our business.

Laws, regulations, and administrative practices in various jurisdictions may be subject to significant change due to economic, political, and other conditions, which could increase our compliance costs and which could include an increase in our future tax liability to those governments. Our failure or inability to comply with existing or future laws, rules or regulations, or changes to existing laws, rules or regulations, in the countries in which we operate could result in violations of contractual or regulatory obligations that may adversely affect our operating results, financial condition, and ability to conduct our business.

Our products are subject to potential product liability claims which, if successful, could have a material adverse effect on our business, financial condition and results of operations.

We currently maintain insurance against product liability claims. However, our insurance coverage may not continue to be available on terms that we accept, if at all. This insurance coverage also may not adequately cover liabilities that we incur. Further, if our products are defective, we may be required to recall or redesign these products. A successful claim against us that exceeds our insurance coverage level or that is not covered by insurance, or any product recall, could have a material adverse effect on our business, financial condition and results of operations.

Net average selling prices of our products may decrease over time, which could have a material adverse effect on our revenues and profitability.

It is not uncommon for the average selling price of a given product to decrease over time as production volumes increase, competing products are developed or new technologies featuring higher performance or lower cost emerge. To combat the negative effects that erosion of average selling prices have had in the past and may in the future have on our net revenues, we attempt to actively manage the prices of our existing products and regularly introduce new process technologies and products in the market that exhibit higher performance, that are in demand, or that lower manufacturing cost.

Inability to use or access our information systems or breaches of our network security could expose us to losses.

We rely upon certain critical information systems for our daily business operations. Our inability to use or access our information systems at critical points in time could unfavourably impact our business operations. Our enterprise

resource planning (“ERP”) system is integral to our ability to accurately and efficiently maintain our books and records, record transactions, provide critical information to our management, and prepare our financial statements. Any disruptions or difficulties that may occur in connection with our ERP system or other systems (whether in connection with the regular operation, periodic enhancements, modifications or upgrades of such systems or the integration of our acquired businesses into such systems) could adversely affect our ability to complete important business processes. Any of these events could have an adverse effect on our business, operating results and financial condition.

We manage and store on our network systems various proprietary information and sensitive or confidential data relating to our operations. There has been an increasing incidence of unauthorized access to the computer networks of various technology companies, and we are not immune to attempted unauthorized access. Computer programmers and hackers may be able to gain unauthorized access to our network system and steal proprietary information, compromise confidential information, create system disruptions, or cause shutdowns. These parties may also be able to develop and deploy viruses, worms, and other malicious software programs that disrupt our operations and create security vulnerabilities. Attacks on our network systems could result in significant losses, compromise our competitive advantages and damage our reputation with customers.

We face risks related to manufacturing interruptions or delays.

We have a single manufacturing facility. This location may be subject to interruptions or delays for a variety of reasons, such as natural or man-made disasters, terrorist activities, disruptions of our information technology resources, and utility interruptions. We have a business continuity plan in place to minimize the impact of disruptions; however, such disruptions may affect our ability to meet customer demand, which could result in the loss of business or customer trust, adversely affecting our business and operating results.

We are exposed to various risks related to legal proceedings, and intellectual property infringement claims, which if successful, could have a material adverse effect on our business, financial condition and results of operations.

From time to time, we may be involved in legal proceedings or claims regarding patent infringement, intellectual property rights, and other matters.

Intellectual property rights are essential to us and our ability to compete effectively with other companies is dependent upon the proprietary nature of our technologies. We rely upon trade secrets, know-how, continuing technological innovations and licensing opportunities to develop, maintain and strengthen our competitive position. We cannot be certain that any pending or future patent applications will result in issued patents, that any current or future patents issued will not be challenged, invalidated or circumvented or that the rights granted thereunder will provide a competitive advantage to us or prevent competitors from entering markets which we currently serve. In addition, we may have to take legal action in the future to protect our trade secrets or know-how or to defend ourselves against claimed infringement of the rights of others. Any legal action of that type could be costly and time consuming to us despite insurance policies owned by us and we cannot be certain of the outcome. The invalidation of key patents or proprietary rights which we own or an unsuccessful outcome in lawsuits to protect our intellectual property could have a material adverse effect on our financial condition and results of operations.

We may infringe on the intellectual property rights of others.

Our commercial success depends, in part, upon us not infringing on the intellectual property rights owned by others. A number of our competitors and other third parties have been issued patents and may have filed patent applications or may obtain additional patents and proprietary rights for technologies similar to those used by us in our products. Some of these patents may grant very broad protection to the owners of the patents. We cannot determine with certainty whether any existing third-party patents or the issuance of any third-party patents would require us to alter our technology, obtain licenses or cease certain activities. We may become subject to claims by third parties that our technology infringes their intellectual property rights due to the growth of products in our target markets, the overlap in functionality of these products and the prevalence of products.

We are exposed to risks associated with an uncertain global economy.

Uncertain global economic and business conditions, along with uncertainties in the financial markets, national debt and fiscal concerns in various regions, pose challenges to the industries in which we operate. Markets for semiconductors depend largely on customer spending and demand for electronic products and have historically been characterized by cyclical fluctuations in product supply and demand. Economic uncertainty and related factors exacerbate negative trends in business and consumer spending and may cause certain customers to push out, cancel, or refrain from purchasing equipment or services, which may have an adverse impact on our revenues,

results of operations and financial condition. Uncertain market conditions, difficulties in obtaining capital, or reduced profitability may also cause some customers to scale back operations, exit businesses, merge with other manufacturers, or file for bankruptcy protection and potentially cease operations, which can also result in lower sales, additional inventory or bad debt expense for us. Conversely, we may have difficulty rapidly and effectively increasing our manufacturing capacity to meet sudden increases in customer demand. If we fail to do so, we may lose business to our competitors and our relationships with our customers may be harmed.

We may engage in future acquisitions or divestitures that could disrupt our business, cause dilution to our shareholders and negatively affect our financial condition and operating results.

We may pursue acquisitions or sales of assets, products or businesses that we believe are complementary to our existing business and/or to enhance our market position or expand our product portfolio. There is a risk that we will not be able to identify suitable acquisition candidates available for sale at reasonable prices, complete any acquisition, or successfully integrate any acquired product or business into our operations. We are also exposed to risks in connection with strategic alliances into which we may enter. If we do not successfully address these risks or any other problems encountered in connection with an acquisition or sale of assets, the acquisition or divestiture transaction could have a material adverse effect on our business, results of operations and financial condition.

The risks inherent in our international operations may adversely impact our results of operations.

We anticipate that we will continue to derive a significant portion of our revenues from operations in the United States and Asia. As we continue to expand internationally, we will need to retain and train our distributors, hire, train and retain qualified personnel for our direct sales efforts, retain and train technical personnel, and train other personnel in countries where language, cultural or regulatory impediments may exist. We cannot ensure that distributors, regulators or other government agencies outside Canada will accept our products, services and business practices. Current or future trade, social and environmental regulations or political issues could restrict the supply of resources used in production or increase its costs. Compliance with such regulations is costly. Failure to comply with applicable legal and regulatory obligations could result in the disruption of our manufacturing, shipping and sales activities. Our international sales operations expose us and our representatives, agents and distributors to risks inherent in operating in foreign jurisdictions.

We face currency and other risks associated with our international sales. We are exposed to foreign currency exchange rate fluctuations due to transactions denominated primarily in United States dollars which may potentially reduce the Canadian dollars we receive for sales and/or increase the Canadian dollars we report as expenses, thereby affecting our reported revenues, profit margins and results of operations. Fluctuations between the currencies in which we do business will cause foreign currency transaction gains and losses. We cannot predict the effects of currency exchange rate fluctuations upon its future operating results because of the variability of currency exposures and the volatility of currency exchange rates.

Our business is dependent on suppliers and customers located throughout the world. Recently, the COVID-19 virus has spread globally, and the World Health Organization has declared it a “pandemic”. The Company is actively assessing and responding where possible to the potential impact of the COVID-19 pandemic. As a result of the spread of the virus, including governments regulating or restricting the flow of labour or products in response to the spread of the virus, the Company's operations, suppliers, customers and distributors could be severely impacted. The pandemic could also have an adverse impact on demand for our products, the availability of, and prices for, our raw materials, and our share price.

The market price of Common Shares has fluctuated and may continue to fluctuate for reasons over which we have no control.

The stock market has from time to time experienced, and is likely to continue to experience, extreme price and volume fluctuations. Prices of securities of technology companies may sometimes be especially volatile and have fluctuated for reasons that are unrelated to the operating performance of the companies. Historically, the market price of the Common Shares has been subject to fluctuation and could continue to fluctuate due to a variety of factors.

We may not be able to maintain an active market for the Common Shares.

There may not be an active, liquid market for the Common Shares. There is no guarantee that an active trading market for the Common Shares will be maintained on the TSX. Investors may not be able to sell their Common Shares quickly or at the latest market price if trading in the Common Shares is not active.

We are exposed to risks associated with climate change.

Global climate change may result in certain natural disasters occurring more frequently or with greater intensity, such as drought, wildfires, storms, sea-level rise, and flooding. Our offices are located in British Columbia and California, and some of our suppliers are located in British Columbia, near major earthquake faults known for seismic activity. The manufacture of product components, the final assembly of our products and other critical operations are concentrated in certain geographic locations. We also rely on partners in Asia to distribute our products. Our operations and those of our significant suppliers, customers and distributors could be adversely affected if manufacturing, logistics or other operations in these locations are disrupted for any reason, such as those listed above or other economic, business, labour, environmental, public health, regulatory or political issues arise as a result of, or in response to, climate change or natural disasters.

Our directors and officers may experience conflicts of interest.

Certain of our directors and officers are also directors and/or officers and/or shareholders of other technology companies. Such associations may give rise to conflicts of interest from time to time. Our directors are required by law to act honestly and in good faith with a view to uphold the best interests of the Company and to disclose any interest that they may have in any project or opportunity of the Company. If a conflict of interest arises at a meeting of the Board, any director in a conflict must disclose his or her interest and abstain from voting on such matter. In determining whether or not we will participate in any project or opportunity, the directors will primarily consider the degree of risk to which we may be exposed and its financial position at the time.

Key personnel may be difficult to attract and retain.

Our ability to maintain and grow our business is directly related to the service of our employees in each area of our business. Our future performance will be directly tied to our ability to hire, train, motivate and retain qualified personnel, including highly skilled technical, financial, managerial and sales and marketing personnel. Competition for personnel in the technology marketplace is intense, and we cannot be certain that we will be successful in attracting and retaining such personnel at compensation levels consistent with our existing compensation and salary structure. If we are unable to hire sufficient numbers of employees with the experience and skills we need or to retain and motivate our existing employees, our business and results of operations would be negatively affected.

We are subject to various environmental laws and regulations that could impose substantial costs upon us and may negatively affect our business, operating results and financial condition.

Some of our operations use substances regulated under various federal, provincial, local, and international laws governing the environment, including those relating to the storage, use, discharge, disposal, labeling, and human exposure to hazardous and toxic materials. We could incur substantial costs, including cleanup costs, fines and civil or criminal sanctions, third-party property damage or personal injury claims, or our products could be enjoined from entering certain jurisdictions, if we were to violate or become liable under environmental laws or if our operations become non-compliant with environmental laws.

DIVIDENDS

Since incorporation, we have not paid any dividends on our Common Shares and do not anticipate doing so in the foreseeable future. Our current capital allocation strategy is to reinvest earnings in research and development to deliver on our new product introduction funnel, open new market opportunities outside the semiconductor industry, and target synergistic technology acquisitions to drive the growth of our business. The declaration and payment of dividends on the Common Shares is at the discretion of the Board. The Company's dividend policy will be reviewed from time to time by the Board in the context of earnings, financial condition and other relevant factors.

DESCRIPTION OF CAPITAL STRUCTURE

Our authorized capital consists of an unlimited number of Common Shares, of which, as at March 18, 2020, 104,513,571 were issued and outstanding, and an unlimited number of preferred shares (the "**Preferred Shares**"), which may be issued in series, of which none were issued and outstanding as at March 18, 2020. The Board is authorized to determine the designation, rights and restrictions to be attached to the Preferred Shares upon issuance.

Holders of Common Shares are entitled to receive notice of any meeting of shareholders and to attend and vote at those meetings, except those meetings at which only the holders of shares of another class or of a particular series are entitled to vote. Each Common Share entitles its holder to one vote. Subject to the rights of the holders of Preferred Shares, the holders of Common Shares are entitled to receive on a proportionate basis such dividends as the Board may declare out of funds legally available therefor. In the event of the dissolution, liquidation, winding up or other distribution of our assets, the holders of the Common Shares are entitled to receive on a proportionate basis all of our assets remaining after payment of all of our liabilities, subject to the rights of holders of Preferred Shares. The Common Shares carry no pre-emptive or conversion rights.

MARKET FOR SECURITIES

The Company transitioned from the TSXV to TSX on May 25, 2018, and our Common Shares trade under the symbol “PHO”. On March 18, 2020, the closing sale price of the Common Shares on the TSX was \$0.70.

Trading Price and Volume

The following table sets out the high and low sale prices per Common Share and the volume of Common Shares traded for the periods indicated.

Month	High	Low	Total Monthly Volume
March 2020 ⁽¹⁾	\$1.17	\$0.65	3,053,208
February 2020	\$1.37	\$1.01	2,166,300
January 2020	\$1.46	\$1.23	3,517,700
December 2019	\$1.43	\$1.04	2,723,300
November 2019	\$1.20	\$1.03	3,011,400
October 2019	\$1.17	\$0.90	1,763,000
September 2019	\$1.03	\$0.90	692,900
August 2019	\$1.12	\$0.82	1,784,500
July 2019	\$1.18	\$1.06	1,405,800
June 2019	\$1.25	\$1.09	1,396,300
May 2019	\$1.43	\$1.17	2,429,200
April 2019	\$1.50	\$1.20	2,175,700
March 2019	\$1.48	\$1.15	3,420,700
February 2019	\$1.57	\$1.25	3,254,200
January 2019	\$1.37	\$1.05	3,394,500

(1) Information provided for the period from March 1, 2020 to March 18, 2020.

Prior Sales

Other than: (i) the exercise of stock options of the Company (the “Options”); and (ii) the settlement of restricted share units of the Company (the “RSUs”), there were no issuances of Common Shares during the fiscal year ended December 31, 2019, except as otherwise disclosed herein.

Photon Control Options

The following table summarizes the number of Options granted by Photon Control during the fiscal year ended December 31, 2019:

Date of Issuance	Exercise Price per Option	Number of Options
March 25, 2019	\$1.25	210,000

May 13, 2019	\$1.26	630,000
June 17, 2019	\$1.22	125,000
August 12, 2019	\$0.93	173,000
September 26, 2019	\$0.98	110,000
November 8, 2019	\$1.12	97,000
December 12, 2019	\$1.08	95,000

Photon Control RSUs

There were no RSU's granted by Photon Control during the fiscal year ended December 31, 2019.

DIRECTORS AND EXECUTIVE OFFICERS

The table set forth below lists the directors and executive officers of the Company as at March 18, 2020, indicating their name, municipalities of residence, their respective positions and offices held with the Company, the length of service and their principal occupations.

Each director is elected at our annual meeting of shareholders to serve until the next annual meeting or until a successor is elected or appointed, unless such director resigns or is removed earlier. To the knowledge of the Company, the directors and executive officers as a group, beneficially own, directly or indirectly, or exercise control or direction over 913,409 Common Shares (not including Common Shares issuable upon the exercise of Options or unvested RSUs), representing as of March 18, 2020 approximately 0.87% of the issued and outstanding Common Shares.

Name and Place of Residence	Principal Occupation	Director and/or Officer Since	Common Shares Beneficially Owned	Percentage of Common Shares Owned ⁽⁴⁾
Charles F. Cargile ⁽¹⁾⁽²⁾ California, U.S.A. <i>Director</i>	CEO, Sunworks, Inc.	March 31, 2017	106,000	0.10%
Michele Klein ⁽¹⁾⁽³⁾ California, U.S.A. <i>Director</i>	CEO, Jasper Ridge Inc.	October 23, 2017	159,000	0.15%
D. Neil McDonnell ⁽²⁾⁽²⁾ British Columbia, Canada <i>Director & Chair of the Board</i>	Independent businessman	November 2, 2016	201,909	0.19%
Nigel Hunton ⁽²⁾ California, U.S.A. <i>Director, CEO & President</i>	CEO, Photon Control	May 2, 2019	110,000	0.11%
Ronan McGrath ⁽¹⁾⁽²⁾ Ontario, Canada <i>Director</i>	Consultant, corporate director & private investor	July 20, 2016	316,000	0.30%
Daniel Lee British Columbia, Canada <i>CFO & Corporate Secretary</i>	CFO & Corporate Secretary, Photon Control	July 15, 2017	20,500	0.02%

(1) Member of the Audit Committee.

(2) Member of the Compensation, Corporate Governance and Nominating Committee.

(3) Member of the M&A Committee.

(4) Based on 104,513,571 Common Shares issued and outstanding as of March 18, 2020.

Information about each of our directors and executive officers, including his or her respective principal occupation during at least the five years preceding December 31, 2019, are as follows:

Charles F. Cargile, Director, Compensation, Corporate Governance & Nominating Committee Chair

Mr. Cargile has served as a Director of Photon Control Inc. since March 2017 and is Chair of the Compensation, Corporate Governance & Nominating Committee. Mr. Cargile has been the CEO of Sunworks, Inc. since 2017 and a Director since 2016. Sunworks, Inc. is a premier provider of high-performance solar power solutions for agriculture, commercial, industrial, public works and residential markets. Prior to his role at Sunworks, Inc., Mr. Cargile was the CFO of Newport Corp., a position he held from 2000 until 2016, until Newport Corp. was acquired by MKS Instruments, Inc. for approximately US \$1 billion in 2016. Mr. Cargile has an extensive background in financial and strategic planning, public company M&A, operations, information technology and capital structure management. Prior to his role at Newport Corp., he worked at York International Corporation and Flowserve Corporation. Mr. Cargile holds an Advanced Professional Director Certification from the American College of Corporate Directors, a Bachelor of Science in Accounting from Oklahoma State University and an MBA from the Marshall School of Business at the University of Southern California.

Michele Klein, Director, M&A Committee Chair

Ms. Klein has served as a Director of Photon Control Inc. since October 2017, and is Chair of the M&A Committee and a member of the Audit Committee. Ms. Klein has been the CEO and a Director of Jasper Ridge Inc., a technology company developing equipment to improve vision since 2010. Prior to Jasper Ridge Inc., Ms. Klein was Senior Director of Applied Ventures, LLC, the venture capital arm of Applied Materials, Inc., where she recommended and managed investments in energy storage and solar energy, representing Applied Materials, Inc. on the boards of seven technology companies. Ms. Klein co-founded Boxer Cross Inc., a semiconductor equipment manufacturer, serving as CEO and Director from 1997 until its acquisition by Applied Materials, Inc. in 2003. She previously co-founded and was a Director of High Yield Technology Inc., a semiconductor metrology company, from 1986 until its acquisition by Pacific Scientific in 1996. Prior to that, Ms. Klein held management positions at Knoll International and Hewlett-Packard. Ms. Klein is a Director of Intevac Inc., manufacturer of thin film deposition and sensor equipment, a Director of Gridtential Energy Inc., battery technology pioneer, an advisory board member of Illuminate Ventures, and a former Chair of Stanford Women on Boards. Ms. Klein earned a BS from the University of Illinois and an MBA from the Stanford Graduate School of Business.

D. Neil McDonnell, Director, Board Chair

Mr. McDonnell has served as a Director of Photon Control Inc. since 2016, Chair of the Board of Directors since 2017, and held the position of Interim CEO from December 2018 until May 2019. He has been President and CEO of Javini Holdings Co., a strategic advisory firm since June 2000. A recognized leader in the Canadian technology space, Mr. McDonnell is currently Chair of Nanotech Security Corp., Director of Quorum Information Technologies Inc., and Director of Redline Communications Inc. He was previously Chair of Agreement Express Inc., Chair of BasicGov Systems, Inc., Director of Espial, Chair of EDP Software, Executive Chair of ResponseTek, Chair of QHR Technologies Inc., Director of Symbility Software Inc., and CEO of Wurdtech Security Technologies Ltd. Mr. McDonnell holds an MBA from the University of British Columbia and a Bachelor of Commerce from the University of Toronto.

Nigel Hunton, Director, CEO & President

Mr. Hunton has served as a Director, the President & CEO of Photon Control Inc. since May 2019. From April 2017 to April 2019, he was President and COO of Ferrotec (USA) Corporation, a leading supplier of materials and components to the semiconductor industry. He was an independent consultant from January 2016 to March 2017. From 2012 to 2015, he was CEO of MBA Polymers Inc., the world's leading cleantech recycler of high value plastics. Prior to his role at MBA Polymers Inc., Mr. Hunton had a 27-year career at BOC and Edwards where he held various positions, including serving as CEO of Edwards from 2006 to 2010 where he was responsible for the sale of Edwards to a private equity firm and successfully restructuring the company, and Chair from 2010 to 2011 where he positioned the company for its eventual IPO in May 2012. Mr. Hunton earned a Bachelor of Science from the University of Manchester Institute of Science and Technology in Mechanical Engineering.

Ronan McGrath, Director, Audit Committee Chair

Mr. McGrath has served as a Director of Photon Control Inc. since July 2016, served as Lead Director from December 2018 until May 2019, and is Chair of the Audit Committee. Mr. McGrath is an investor and corporate director. He also consults on strategic issues to major technology companies. Mr. McGrath is currently a Director and Audit Committee Chair of Nanotech Security Corp., and has previously served as Lead Director and Audit

Committee Chair of Symbility Solutions Inc. He is the former Chief Information Officer of Rogers Communications Inc. and former President of Rogers Shared Services. He was responsible for the team that restructured the alliance between Rogers and Microsoft in July 1999. Prior to his role at Rogers, Mr. McGrath was the Chief Information Officer of Canadian National Railway Company, responsible for the complete rebuild of its information technology capability, the restructuring of the company, and the development of the initial strategic review of the company's future that led to privatization of the company. He was awarded the Chief Information Officer of the Year award in Canada in 1995, has served in the past on the advisory boards of a number of technology companies, including Compaq Computer Corporation and Lotus Development Corporation, and is a past Chair of the Information Technology Association of Canada (ITAC). Mr. McGrath, a Chartered Accountant, is a graduate in Business Administration at Trinity College, Dublin.

Daniel Lee, CFO, Corporate Secretary

Mr. Lee has been the CFO of Photon Control since July 2017 and Corporate Secretary since December 2018. Mr. Lee joined the Company in April 2017, serving as VP Finance until his appointment as CFO. From 2015 to 2016, Mr. Lee served as Director of Finance at BSM Technologies Inc., a provider of remote monitoring, fleet and asset management, fleet diagnostic, driver compliance and automatic vehicle location solutions, following the merger of equals transaction with Webtech Wireless Inc. Mr. Lee was instrumental in the merger of equals transaction between the two companies which was completed in September 2015. Prior to the merger, Mr. Lee served as Director of Finance at Webtech Wireless Inc. from 2011 to 2015. Mr. Lee has over 15 years of progressive finance and accounting experience, with a focus on Canadian publicly listed technology companies. Mr. Lee is a Chartered Accountant, having earned his Bachelor of Business Administration degree from Simon Fraser University, and completed the CFO Leadership Program from the Rotman School of Management at University of Toronto.

Cease Trade Orders, Bankruptcies, Penalties or Sanctions

To the best of the Company's knowledge, none of the directors or executive officers of the Company is, as at the date of this AIF, or was within 10 years before the date of this AIF, a director, chief executive officer or chief financial officer of any company (including the Company) that:

- a) was subject to a cease trade order, an order similar to a cease trade order or an order that denied the relevant company access to any exemption under securities legislation which, in each case, was in effect for a period of more than 30 consecutive days (each, an "order") that was issued while the director or executive officer was acting in the capacity as director, chief executive officer or chief financial officer, or
- b) was subject to an order that was issued after the director or executive officer ceased to be a director, chief executive officer or chief financial officer and which resulted from an event that occurred while that person was acting in the capacity as director, chief executive officer or chief financial officer.

To the best of the Company's knowledge, no director or executive officer of the Company or a shareholder holding a sufficient number of securities of the Company to affect materially its control:

- a) is, as at the date of this AIF, or has been within the 10 years before the date of the AIF, a director or executive officer of any company (including the Company) that, while that person was acting in that capacity, or within a year of that person ceasing to act in that capacity, became bankrupt, made a proposal under any legislation relating to bankruptcy or insolvency or was subject to or instituted any proceedings, arrangement or compromise with creditors or had a receiver, receiver manager or trustee appointed to hold its assets;
- b) has, within the 10 years before the date of this AIF, become bankrupt, made a proposal under any legislation relating to bankruptcy or insolvency, or become subject to or instituted any proceedings, arrangement or compromise with creditors, or had a receiver, receiver manager or trustee appointed to hold the assets of the director, executive officer or shareholder;
- c) has been subject to:
 - i) any penalties or sanctions imposed by a court relating to securities legislation or by a securities regulatory authority or has entered into a settlement agreement with a securities regulatory authority; or
 - ii) any other penalties or sanctions imposed by a court or regulatory body that would likely be considered important to a reasonable investor in making an investment decision.

Conflicts of Interest

Certain of the directors and officers of Photon Control also serve, or may serve in the future, as directors and/or officers of other companies involved in technology-based companies; consequently, there exists the possibility for these directors and officers to be in a position of conflict. Any decision made by any of these directors and officers involving Photon Control will be made in accordance with their duties and obligations to deal fairly and in good faith with a view to the best interests of Photon Control and its shareholders. In addition, each of the directors is required to declare and refrain from voting on any matter in which these directors may have a conflict of interest in accordance with the procedures set forth in applicable laws.

PROMOTERS

The Company has not engaged a promoter during the past two financial years, or during the current financial year.

LEGAL PROCEEDINGS AND REGULATORY ACTIONS

Legal Proceedings

The Company was not party to, nor any of its property was the subject of, any material legal proceedings against it during the financial year ended December 31, 2019. To the best of the Company's knowledge, no such legal proceedings are currently contemplated.

Regulatory Actions

There were no regulatory actions during the fiscal year ended December 31, 2019, and as of the date of this AIF, there have been no penalties or sanctions imposed against Photon Control (a) by a court relating to securities legislation or by a securities regulatory authority; or (b) by a court or regulatory body that would likely be considered important to a reasonable investor making an investment decision in Photon Control. Photon Control has not entered into any settlement agreements before a court relating to securities legislation or with a securities regulatory authority during the fiscal year ended December 31, 2019 or from that period to the date of this AIF.

INTEREST OF MANAGEMENT AND OTHERS IN MATERIAL TRANSACTIONS

None of the following persons have had any direct or indirect material interest in any transaction of the Company within the three most recently completed financial years or during the current financial year that has materially affected or is reasonably expected to materially affect the Company:

- a director or executive officer of the Company;
- a person or corporation that is the direct or indirect beneficial owner of, or who exercises control or direction over, more than 10% of any class or series of the outstanding voting securities of the Company; and
- an associate or affiliate of any of the persons or companies referred to in this section.

REGISTRAR AND TRANSFER AGENT

The Registrar and Transfer Agent for the Common Shares in Canada is the Computershare Trust Company of Canada, 510 Burrard Street, 3rd Floor, Vancouver, British Columbia, V6C 3B9.

MATERIAL CONTRACTS

Except for contracts entered into in the ordinary course of business, the Company is not currently party to any material contracts.

EXPERTS

Our consolidated financial statements at December 31, 2019 have been audited by KPMG LLP, independent registered Chartered Professional Accountants, our external auditors. As set forth in its report, KPMG LLP has confirmed with respect to the Company that is independent within the meaning of the relevant rules and related interpretations prescribed by the relevant professional bodies in Canada and any applicable legislation or regulations.

ADDITIONAL INFORMATION

Additional information about Photon Control may be found on the System for Electronic Analysis and Retrieval (“SEDAR”) at www.sedar.com including directors’ and officers’ remuneration and indebtedness, principal holders of the Company’s securities and securities authorized for issuance under equity compensation plans, is contained in the Company’s Information Circular for its most recent annual meeting of shareholders. Additional financial information is also provided in the Company’s audited financial statements and related management discussion and analysis for the years ended December 31, 2019 and 2018.

Further additional information about Photon Control, including copies of these documents may be found on Photon Control’s website at www.photoncontrol.com and under the Company’s profile on SEDAR at www.sedar.com.

AUDIT COMMITTEE

Audit Committee Charter

Photon Control’s audit committee (the “**Audit Committee**”) is responsible for monitoring Photon Control’s systems and procedures for financial reporting and internal control, reviewing certain public disclosure documents and monitoring the performance and independence of Photon Control’s external auditors. The Audit Committee is also responsible for reviewing Photon Control’s annual audited consolidated financial statements, unaudited interim consolidated financial statements and management’s discussion and analysis of financial results of operations for both annual and interim consolidated financial statements and review of related operations prior to their approval by the full Board.

The Audit Committee has a charter that sets out its mandate and responsibilities. A copy of the charter is attached as Schedule “A” to this AIF.

Composition of the Audit Committee

The current members of the Audit Committee are Messrs. McGrath and Cargile and Ms. Klein. All members of the Audit Committee are independent directors in accordance with National Instrument 52-110 - Audit Committees (“**NI 52-110**”) and are “financially literate” within the meaning of Section 1.6 of NI 52-110, as a result of their prior financial experience in a management capacity or as members of audit committees of public companies.

Relevant Education and Experience

Set out below is a general description of the education and experience of each current Audit Committee member which is relevant to the performance of his or her responsibilities as an Audit Committee member, as set out in Form 52-110F1 - Audit Committee Information Required in an AIF. See “Directors and Executive Officers” above for additional biographical details.

Ronan McGrath (Chair)

Mr. McGrath is the former Chief Information Officer of Rogers Communications Inc., former President of Rogers Shared Services, and the former Chief Information Officer of Canadian National Railway Company. Mr. McGrath is currently a Director and Audit Committee Chair of Nanotech Security Corp (TSX.V: NTS) and former Lead Director and Audit Committee Chair of Symbility Solutions Inc. He has also served in the past on the advisory boards of a number of technology companies, including Compaq Computer Corporation and Lotus Development Corporation, and is a past Chair of the Information Technology Association of Canada (ITAC). He previously worked in various capacities for Arthur Andersen & Co in various European countries and Canada. He is a graduate in Business Administration from Trinity College Dublin and a Chartered Accountant.

Charles F. Cargile

Mr. Cargile is the CEO and a Director of Sunworks, Inc. (NASDAQ: SUNW). Prior to his role at Sunworks, Inc., Mr. Cargile was the CFO of Newport Corp., a position he held for 16 years. Mr. Cargile has 25 years of public company experience and has an extensive background in financial and strategic planning, public company M&A, operations, information technology and capital structure management. Prior to his role at Newport Corp., he worked at York International Corporation in several officer positions, including Vice President of Finance and Corporate Development and at Flowserve Corporation most recently as Principal Accounting Officer and Corporate Controller. Mr. Cargile has also serviced in the past on the boards of a number of public companies, including Lead Independent Director and Audit Committee Chair of Netlist Inc. and a Director of Reed's, Inc. He holds an Advanced Professional Director Certification from the American College of Corporate Directors, a Bachelor of Science in Accounting from Oklahoma State University and an MBA from the Marshall School of Business at the University of Southern California.

Michele Klein

Ms. Klein has been a Director of Photon Control since October 2017, is Chair of the M&A Committee and is a member of the Audit Committee. She has been the CEO and a Director of Jasper Ridge Inc., a technology company developing equipment to improve human vision since 2010. Prior to Jasper Ridge, Ms. Klein was Senior Director of Applied Ventures, the venture capital arm of Applied Materials, Inc. (NASDAQ: AMAT), where she recommended and managed investments in energy storage, solar energy and metrology, representing Applied Materials, Inc. on the boards of seven technology companies. Ms. Klein co-founded and led Boxer Cross Inc., a semiconductor equipment manufacturer, as CEO until its acquisition by Applied Materials, Inc. in 2003, and High Yield Technology Inc., a semiconductor metrology company, until its acquisition by Pacific Scientific. Ms. Klein is a Director of Intevac Inc. (NASDAQ: IVAC), Director of Gridtential Energy Inc., an advisory board member of Illuminate Ventures, and a former chair of Stanford Women on Boards. Ms. Klein earned a BS from the University of Illinois and an MBA from the Stanford Graduate School of Business.

Audit Committee Oversight

The directors of the Company have accepted all recommendations of the Audit Committee since the commencement of the most recently completed financial year regarding the recommendation to nominate or compensate an external auditor.

Pre-Approval Policies and Procedures

The Audit Committee shall have authority and responsibility for pre-approval of all non-audit services to be provided to the Company or its subsidiary entities by the external auditors or the external auditors of the Company's subsidiary entities, unless such pre-approval is otherwise appropriately delegated or if appropriate specific policies and procedures for the engagement of non-audit services have been adopted by the Audit Committee.

External Auditor Service Fees

The aggregate fees billed by the Company's external auditors in each of the last two fiscal years for audit fees are as follows:

Financial Year Ending	Audit Fees ⁽¹⁾	Audit Related Fees ⁽²⁾	Tax Fees ⁽³⁾	All Other Fees ⁽⁴⁾
December 31, 2019	\$143,198	Nil	\$208,551	Nil
December 31, 2018	\$144,504	Nil	\$145,900	Nil

(1) Audit Fees consist of fees paid or accrued for the annual audit and quarterly review of Photon Control's financial statements or services that are normally provided by the external auditor in connection with statutory and regulatory filings or engagements and include consultations concerning the review of disclosure controls and procedures and internal controls over financial reporting.

(2) Audit Related Fees for 2019 and 2018 were nil.

(3) Tax Fees include fees paid or accrued for tax compliance services, including the preparation of original and amended tax returns; tax consultations, such as assistance and representation in connection with tax advice related to historical tax exposure; mergers and acquisitions; tax planning services; and consultation and planning services.

(4) No Other Fees were billed by the external auditors in 2019 or 2018 for services other than those indicated above.

SCHEDULE "A" PHOTON CONTROL INC. AUDIT COMMITTEE MANDATE

As of February 2018

1. Introduction

The Audit Committee (the "**Committee**" or the "**Audit Committee**") of Photon Control Inc. (the "**Company**") is a committee of the Board of Directors (the "**Board**") of the Company. The Committee shall oversee the accounting and financial reporting practices of the Company and the audits of the Company's financial statements and exercise the responsibilities and duties set out in this Mandate.

2. Membership

Number of Members

The Committee shall be composed of three or more members of the Board.

Independence of Members

Each member of the Committee must be independent, subject to any exemptions or relief that may be granted from such requirement. "Independent" shall have the meaning, as the context requires, given to it in National Instrument 52-110 Audit Committees, as may be amended from time to time.

Chair

At the time of the annual appointment of the members of the Audit Committee, the Board shall appoint a Chair of the Audit Committee. The Chair shall be a member of the Audit Committee, preside over all Audit Committee meetings, coordinate the Audit Committee's compliance with this Mandate, work with management to develop the Audit Committee's annual work-plan and provide reports of the Audit Committee to the Board.

Financial Literacy of Members

At the time of his or her appointment to the Committee, each member of the Committee shall have, or shall acquire within a reasonable time following appointment to the Committee, the ability to read and understand a set of financial statements that present a breadth and level of complexity of accounting issues that are generally comparable to the breadth and complexity of the issues that can reasonably be expected to be raised by the Company's financial statements.

Term of Members

The members of the Committee shall be appointed annually by the Board. Each member of the Committee shall serve at the pleasure of the Board until the member resigns, is removed, or ceases to be a member of the Board. Unless a Chair is elected by the Board, the members of the Committee may designate a Chair by majority vote of the full Committee membership.

3. Meetings

Number of Meetings

The Committee may meet as many times per year as necessary to carry out its responsibilities.

Quorum

No business may be transacted by the Committee at a meeting unless a quorum of the Committee is present. A majority of members of the Committee shall constitute a quorum.

Calling of Meetings

The Chair, any member of the Audit Committee, the external auditors, the Chairman of the Board, or the Chief Executive Officer or the Chief Financial Officer may call a meeting of the Audit Committee by notifying the Company's Corporate Secretary who will notify the members of the Audit Committee. The Chair shall chair all Audit Committee meetings that he or she attends, and in the absence of the Chair, the members of the Audit Committee present may appoint a chair from their number for a meeting.

Minutes; Reporting to the Board

The Committee shall maintain minutes or other records of meetings and activities of the Committee in sufficient detail to convey the substance of all discussions held. Upon approval of the minutes by the

Committee, the minutes shall be circulated to the members of the Board. However, the Chair may report orally to the Board on any matter in his or her view requiring the immediate attention of the Board.

Attendance of Non-Members

The external auditors are entitled to attend and be heard at each Audit Committee meeting. In addition, the Committee may invite to a meeting any officers or employees of the Company, legal counsel, advisors and other persons whose attendance it considers necessary or desirable in order to carry out its responsibilities.

Meetings without Management

The Committee shall hold unscheduled or regularly scheduled meetings, or portions of meetings, at which management is not present.

Procedure

The procedures for calling, holding, conducting and adjourning meetings of the Committee shall be the same as those applicable to meetings of the Board.

Access to Management

The Committee shall have unrestricted access to the Company's management and employees and the books and records of the Company.

4. Duties and Responsibilities

The Committee shall have the functions and responsibilities set out below as well as any other functions that are specifically delegated to the Committee by the Board and that the Board is authorized to delegate by applicable laws and regulations. In addition to these functions and responsibilities, the Committee shall perform the duties required of an audit committee by any exchange upon which securities of the Company are traded, or any governmental or regulatory body exercising authority over the Company, as are in effect from time to time (collectively, the "**Applicable Requirements**").

Financial Reports

(a) **General**

The Audit Committee is responsible for overseeing the Company's financial statements and financial disclosures. Management is responsible for the preparation, presentation and integrity of the Company's financial statements and financial disclosures and for the appropriateness of the accounting principles and the reporting policies used by the Company. The auditors are responsible for auditing the Company's annual consolidated financial statements and for reviewing the Company's unaudited interim financial statements.

(b) **Review of Annual Financial Reports**

The Audit Committee shall review the annual consolidated audited financial statements of the Company, the auditors' report thereon and the related management's discussion and analysis of the Company's financial condition and results of operation ("**MD&A**"). After completing its review, if advisable, the Audit Committee shall approve and recommend for Board approval the annual financial statements and the related MD&A.

(c) **Review of Interim Financial Reports**

The Audit Committee shall review the interim consolidated financial statements of the Company, the auditors' review report thereon and the related MD&A. After completing its review, if advisable, the Audit Committee shall approve and recommend for Board approval the interim financial statements and the related MD&A.

(d) **Review Considerations**

In conducting its review of the annual financial statements or the interim financial statements, the Audit Committee shall:

- (i) meet with management and the auditors to discuss the financial statements and MD&A;
- (ii) review the disclosures in the financial statements;
- (iii) review the audit report or review report prepared by the auditors;

- (iv) discuss with management, the auditors and internal legal counsel (if any), as requested, any litigation claim or other contingency that could have a material effect on the financial statements;
 - (v) review the accounting policies followed and critical accounting and other significant estimates and judgements underlying the financial statements as presented by management;
 - (vi) review any material effects of regulatory accounting initiatives or off-balance sheet structures on the financial statements as presented by management, including requirements relating to complex or unusual transactions, significant changes to accounting principles and alternative treatments under Canadian GAAP;
 - (vii) review any material changes in accounting policies and any significant changes in accounting practices and their impact on the financial statements as presented by management;
 - (viii) review management's report on the effectiveness of internal controls over financial reporting;
 - (ix) review the factors identified by management as factors that may affect future financial results;
 - (x) review results of the Company's audit committee whistleblower hotline program; and
 - (xi) review any other matters, related to the financial statements, that are brought forward by the auditors, management or which are required to be communicated to the Audit Committee under accounting policies, auditing standards or Applicable Requirements.
- (e) **Approval of Other Financial Disclosures**
The Audit Committee shall review and, if advisable, approve and recommend for Board approval financial disclosure in a prospectus or other securities offering document of the Company, press releases disclosing, or based upon, financial results of the Company and any other material financial disclosure, including financial guidance provided to analysts, rating agencies or otherwise publicly disseminated.

Auditors

- (a) **General**
The Audit Committee shall be responsible for oversight of the work of the auditors, including the auditors' work in preparing or issuing an audit report, performing other audit, review or attest services or any other related work.
- (b) **Nomination and Compensation**
The Audit Committee shall review and, if advisable, select and recommend for Board approval the external auditors to be nominated and the compensation of such external auditor. The Audit Committee shall have ultimate authority to approve all audit engagement terms and fees, including the auditors' audit plan.
- (c) **Resolution of Disagreements**
The Audit Committee shall resolve any disagreements between management and the auditors as to financial reporting matters brought to its attention.
- (d) **Discussions with Auditors**
At least annually, the Audit Committee shall discuss with the auditors such matters as are required by applicable auditing standards to be discussed by the auditors with the Audit Committee.
- (e) **Audit Plan**
At least annually, the Audit Committee shall review a summary of the auditors' annual audit plan. The Audit Committee shall consider and review with the auditors any material changes to the scope of the plan.
- (f) **Quarterly Review Report**
The Audit Committee shall review a report prepared by the auditors in respect of each of the interim financial statements of the Company.

(g) **Independence of Auditors**

At least annually, and before the auditors issue their report on the annual financial statements, the Audit Committee shall obtain from the auditors a formal written statement describing all relationships between the auditors and the Company; discuss with the auditors any disclosed relationships or services that may affect the objectivity and independence of the auditors; and obtain written confirmation from the auditors that they are objective and independent within the meaning of the applicable Rules of Professional Conduct/Code of Ethics adopted by the provincial institute or order of chartered accountants to which the auditors belong and other Applicable Requirements. The Audit Committee shall take appropriate action to oversee the independence of the auditors.

(h) **Evaluation and Rotation of Lead Partner**

At least annually, the Audit Committee shall review the qualifications and performance of the lead partner(s) of the auditors and determine whether it is appropriate to adopt or continue a policy of rotating lead partners of the external auditors.

(i) **Requirement for Pre-Approval of Non-Audit Services**

The Audit Committee shall approve in advance any retainer of the auditors to perform any non-audit service to the Company that it deems advisable in accordance with Applicable Requirements and Board approved policies and procedures. The Audit Committee may delegate pre-approval authority to a member of the Audit Committee. The decisions of any member of the Audit Committee to whom this authority has been delegated must be presented to the full Audit Committee at its next scheduled Audit Committee meeting.

(j) **Approval of Hiring Policies**

The Audit Committee shall review and approve the Company's hiring policies regarding partners, employees and former partners and employees of the present and former external auditors of the Company.

(k) **Financial Executives**

The Committee shall review and discuss with management the appointment of key financial executives and recommend qualified candidates to the Board, as appropriate.

Internal Controls

(a) **General**

The Audit Committee shall review the Company's system of internal controls.

(b) **Establishment, Review and Approval**

The Audit Committee shall require management to implement and maintain appropriate systems of internal controls in accordance with Applicable Requirements, including internal controls over financial reporting and disclosure and to review, evaluate and approve these procedures. At least annually, the Audit Committee shall consider and review with management and the auditors:

- (i) the effectiveness of, or weaknesses or deficiencies in: the design or operation of the Company's internal controls (including computerized information system controls and security); the overall control environment for managing business risks; and accounting, financial and disclosure controls (including, without limitation, controls over financial reporting), non-financial controls, and legal and regulatory controls and the impact of any identified weaknesses in internal controls on management's conclusions;
- (ii) any significant changes in internal controls over financial reporting that are disclosed, or considered for disclosure, including those in the Company's periodic regulatory filings;
- (iii) any material issues raised by any inquiry or investigation by the Company's regulators;
- (iv) the Company's fraud prevention and detection program, including deficiencies in internal controls that may impact the integrity of financial information, or may expose the Company to other significant internal or external fraud losses and the extent of those losses and any disciplinary action in respect of fraud taken against management or other employees who have a significant role in financial reporting; and

- (v) any related significant issues and recommendations of the auditors together with management's responses thereto, including the timetable for implementation of recommendations to correct weaknesses in internal controls over financial reporting and disclosure controls.

Compliance with Legal and Regulatory Requirements

The Audit Committee shall review reports from the Company's Corporate Secretary and other management members on: legal or compliance matters that may have a material impact on the Company; the effectiveness of the Company's compliance policies; and any material communications received from regulators. The Audit Committee shall review management's evaluation of and representations relating to compliance with specific applicable law and guidance, and management's plans to remediate any deficiencies identified.

Audit Committee Hotline Whistleblower Procedures

The Audit Committee shall establish procedures for (a) the receipt, retention, and treatment of complaints received by the Company regarding accounting, internal accounting controls, or auditing matters; and (b) the confidential, anonymous submission by employees of the Company of concerns regarding questionable accounting or auditing matters. Any such complaints or concerns that are received shall be reviewed by the Audit Committee and, if the Audit Committee determines that the matter requires further investigation, it will direct the Chair of the Audit Committee to engage outside advisors, as necessary or appropriate, to investigate the matter and will work with management and the general counsel to reach a satisfactory conclusion.

Audit Committee Disclosure

The Audit Committee shall prepare, review and approve any audit committee disclosures required by Applicable Requirements in the Company's disclosure documents.

Delegation

The Audit Committee may, to the extent permissible by Applicable Requirements, designate a sub-committee to review any matter within this mandate as the Audit Committee deems appropriate.

5. Independent Advisors

The Audit Committee shall have the authority to retain external legal counsel, consultants or other advisors to assist it in fulfilling its responsibilities and to set and pay the respective compensation for these advisors without consulting or obtaining the approval of the Board or any Company officer. The Company shall provide appropriate funding, as determined by the Audit Committee, for the services of these advisors.

6. No Rights Created

This Mandate is a statement of broad policies and is intended as a component of the flexible governance framework within which the Audit Committee, functions. While it should be interpreted in the context of all applicable laws, regulations and listing requirements, as well as in the context of the Company's Notice of Articles and Articles, it is not intended to establish any legally binding obligations.

7. Mandate Review

The Committee shall review and update this Mandate annually and present it to the Board for approval.

Adopted: February 2018