

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**

Washington, D.C. 20549

FORM 10-Q

(Mark One)

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

For the quarterly period ended September 30, 2020

OR

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

For the transition period from _____ to _____

Commission file number: 001-36481

ASPEN AEROGELS, INC.

(Exact name of registrant as specified in its charter)

Delaware

(State or other jurisdiction of
incorporation or organization)

30 Forbes Road, Building B
Northborough, Massachusetts
(Address of principal executive offices)

04-3559972

(I.R.S. Employer
Identification No.)

01532

(Zip Code)

Registrant's telephone number, including area code: (508) 691-1111

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

Title of each class	Trading Symbol	Name of exchange on which registered
Common Stock, par value \$0.00001 per share	ASPN	The New York Stock Exchange

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.

Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

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

Large accelerated filer ☐

Non-accelerated filer ☐

Accelerated filer ☒

Smaller reporting company ☒

Emerging growth company ☐

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

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

As of November 5, 2020, the registrant had 26,867,920 shares of common stock outstanding.

ASPEN AEROGELS, INC.

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Trademarks, Trade Names and Service Marks

We own or have rights to use "Aspen Aerogels," "Cryogel," "Pyrogel," "Spaceloft," "PyroThin," the Aspen Aerogels logo and other trademarks, service marks and trade names of Aspen Aerogels, Inc. appearing in this Quarterly Report on Form 10-Q. Solely for convenience, the trademarks, service marks and trade names referred to in this report are presented without the ® and TM symbols, but such references are not intended to indicate, in any way, that the owner thereof will not assert, to the fullest extent under applicable law, such owner's rights to these trademarks, service marks and trade names. This report contains additional trademarks, service marks and trade names of other companies, which, to our knowledge, are the property of their respective owners.

PART I — FINANCIAL INFORMATION

Item 1. Financial Statements.

ASPEN AEROGELS, INC.
Consolidated Balance Sheets
(Unaudited)

	September 30, 2020	December 31, 2019
	(In thousands, except share and per share data)	
Assets		
Current assets:		
Cash and cash equivalents	\$ 11,314	\$ 3,633
Accounts receivable, net of allowances of \$295 and \$144	20,072	32,254
Inventories	9,427	8,768
Prepaid expenses and other current assets	1,595	1,114
Total current assets	42,408	45,769
Property, plant and equipment, net	48,099	53,617
Operating lease right-of-use assets	3,702	4,032
Other long-term assets	88	84
Total assets	\$ 94,297	\$ 103,502
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	\$ 8,354	\$ 12,596
Accrued expenses	4,081	8,057
Current portion of long-term debt	367	—
Revolving line of credit	—	3,123
Deferred revenue	2,275	5,620
Operating lease liabilities	1,056	1,038
Total current liabilities	16,133	30,434
Prepayment liability	9,568	9,786
Long-term debt	3,298	—
Operating lease liabilities long-term	3,845	4,292
Other long-term liabilities	566	—
Total liabilities	33,410	44,512
Commitments and contingencies (Note 8)		
Stockholders' equity:		
Preferred stock, \$0.00001 par value; 5,000,000 shares authorized, no shares issued and outstanding at September 30, 2020 and December 31, 2019	—	—
Common stock, \$0.00001 par value; 125,000,000 shares authorized, 26,865,309 and 24,302,504 shares issued and outstanding at September 30, 2020 and December 31, 2019, respectively	—	—
Additional paid-in capital	562,657	545,140
Accumulated deficit	(501,770)	(486,150)
Total stockholders' equity	60,887	58,990
Total liabilities and stockholders' equity	\$ 94,297	\$ 103,502

See accompanying notes to unaudited consolidated financial statements.

ASPEN AEROGELS, INC.
Consolidated Statements of Operations
(Unaudited)

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2020	2019	2020	2019
(In thousands, except share and per share data)				
Revenue:				
Product	\$ 23,939	\$ 35,046	\$ 76,772	\$ 90,739
Research services	256	379	483	2,131
Total revenue	24,195	35,425	77,255	92,870
Cost of revenue:				
Product	22,243	27,510	66,403	76,703
Research services	52	173	121	1,193
Gross profit	1,900	7,742	10,731	14,974
Operating expenses:				
Research and development	2,088	2,046	6,436	5,842
Sales and marketing	2,755	3,992	9,051	11,012
General and administrative	3,761	3,857	10,682	11,449
Total operating expenses	8,604	9,895	26,169	28,303
Loss from operations	(6,704)	(2,153)	(15,438)	(13,329)
Interest expense, net	(49)	(136)	(182)	(280)
Total interest expense, net	(49)	(136)	(182)	(280)
Net loss	<u>\$ (6,753)</u>	<u>\$ (2,289)</u>	<u>\$ (15,620)</u>	<u>\$ (13,609)</u>
Net loss per share:				
Basic and diluted	<u>\$ (0.25)</u>	<u>\$ (0.09)</u>	<u>\$ (0.60)</u>	<u>\$ (0.57)</u>
Weighted-average common shares outstanding:				
Basic and diluted	<u>26,728,205</u>	<u>24,171,811</u>	<u>26,150,236</u>	<u>24,074,565</u>

See accompanying notes to unaudited consolidated financial statements.

ASPEN AEROGELS, INC.
Consolidated Statements of Stockholders' Equity
(Unaudited)
(In thousands, except share data)

	Preferred Stock \$0.00001 Par Value		Common Stock \$0.00001 Par Value		Additional Paid-in Capital	Accumulated Deficit	Total Stockholders' Equity
	Shares	Value	Shares	Value			
Balance at December 31, 2019	—	\$ —	24,302,504	\$ —	\$ 545,140	\$ (486,150)	\$ 58,990
Net loss	—	—	—	—	—	(3,169)	(3,169)
Stock compensation expense	—	—	—	—	992	—	992
Vesting of restricted stock units	—	—	336,951	—	(1,195)	—	(1,195)
Proceeds from underwritten public offering, net of underwriting discounts and commissions of \$1,093 and issuance costs of \$285	—	—	1,955,000	—	14,751	—	14,751
Balance at March 31, 2020	—	—	26,594,455	—	559,688	(489,319)	70,369
Net loss	—	—	—	—	—	(5,698)	(5,698)
Stock compensation expense	—	—	—	—	1,007	—	1,007
Issuance of restricted stock	—	—	45,066	—	—	—	—
Vesting of restricted stock units	—	—	5,629	—	(16)	—	(16)
Proceeds from employee stock option exercises	—	—	200,159	—	869	—	869
Balance at June 30, 2020	—	—	26,845,309	—	561,548	(495,017)	66,531
Net loss	—	—	—	—	—	(6,753)	(6,753)
Stock compensation expense	—	—	—	—	991	—	991
Proceeds from employee stock option exercises	—	—	20,000	—	118	—	118
Balance at September 30, 2020	—	\$ —	26,865,309	\$ —	\$ 562,657	\$ (501,770)	\$ 60,887

	Preferred Stock \$0.00001 Par Value		Common Stock \$0.00001 Par Value		Additional Paid-in Capital	Accumulated Deficit	Total Stockholders' Equity
	Shares	Value	Shares	Value			
Balance at December 31, 2018	—	\$ —	23,973,517	\$ —	\$ 541,839	\$ (471,585)	\$ 70,254
Net loss	—	—	—	—	—	(6,002)	(6,002)
Stock compensation expense	—	—	—	—	878	—	878
Vesting of restricted stock units	—	—	273,290	—	(454)	—	(454)
Balance at March 31, 2019	—	—	24,246,807	—	542,263	(477,587)	64,676
Net loss	—	—	—	—	—	(5,318)	(5,318)
Stock compensation expense	—	—	—	—	996	—	996
Issuance of restricted stock	—	—	50,328	—	—	—	—
Vesting of restricted stock units	—	—	3,129	—	(10)	—	(10)
Balance at June 30, 2019	—	—	24,300,264	—	543,249	(482,905)	60,344
Net loss	—	—	—	—	—	(2,289)	(2,289)
Stock compensation expense	—	—	—	—	1,011	—	1,011
Balance at September 30, 2019	—	\$ —	24,300,264	\$ —	\$ 544,260	\$ (485,194)	\$ 59,066

See accompanying notes to unaudited consolidated financial statements.

ASPEN AEROGELS, INC.
Consolidated Statements of Cash Flows
(Unaudited)

	Nine Months Ended September 30,	
	2020	2019
	(In thousands)	
Cash flows from operating activities:		
Net loss	\$ (15,620)	\$ (13,609)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation	7,670	7,651
Amortization of debt issuance costs	6	—
Provision for bad debt	171	—
Stock-compensation expense	2,990	2,885
Reduction in the carrying amount of operating lease right-of-use assets	719	702
Changes in operating assets and liabilities:		
Accounts receivable	12,011	1,203
Inventories	(659)	(6,141)
Prepaid expenses and other assets	(485)	(484)
Accounts payable	(3,794)	(2,865)
Accrued expenses	(3,976)	826
Deferred revenue	(3,563)	4,870
Operating lease liabilities	(818)	(743)
Other liabilities	566	(56)
Net cash used in operating activities	(4,782)	(5,761)
Cash flows from investing activities:		
Capital expenditures	(2,600)	(1,589)
Net cash used in investing activities	(2,600)	(1,589)
Cash flows from financing activities:		
Proceeds from underwritten public offering, net of underwriting discounts and commissions of \$1,093	15,036	—
Issuance costs from underwritten public offering	(285)	—
Proceeds from issuance of long-term debt	3,686	—
Issuance costs from long-term debt	(27)	—
Proceeds from (repayments of) borrowings under line of credit, net	(3,123)	682
Prepayment proceeds under customer supply agreement	—	5,000
Proceeds from employee stock option exercises	987	—
Payments made for employee restricted stock tax withholdings	(1,211)	(464)
Net cash provided by financing activities	15,063	5,218
Net increase (decrease) in cash	7,681	(2,132)
Cash and cash equivalents at beginning of period	3,633	3,327
Cash and cash equivalents at end of period	\$ 11,314	\$ 1,195
Supplemental disclosures of cash flow information:		
Interest paid	\$ 168	\$ 333
Income taxes paid	\$ —	\$ —
Supplemental disclosures of non-cash activities:		
Initial recognition of operating lease liabilities related to right-of-use assets	\$ —	\$ 5,995
Right-of-use assets obtained in exchange for new operating lease liabilities	\$ 389	\$ 353
Changes in accrued capital expenditures	\$ (448)	\$ (430)

See accompanying notes to unaudited consolidated financial statements.

ASPEN AEROGELS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(UNAUDITED)

(1) Description of Business and Basis of Presentation

Nature of Business

Aspen Aerogels, Inc. (the Company) is an aerogel technology company that designs, develops and manufactures innovative, high-performance aerogel insulation used primarily in the energy infrastructure and building materials markets. In addition, the Company is developing high value applications for its aerogel technology in the electric vehicle market. The Company also conducts research related to aerogel technology supported by funding from several agencies of the U.S. government and other institutions in the form of research contracts. The Company has decided to cease efforts to secure additional funded research contracts and to wind down existing contract research activities.

The Company maintains its corporate offices in Northborough, Massachusetts. The Company has three wholly owned subsidiaries: Aspen Aerogels Rhode Island, LLC, Aspen Aerogels Germany, GmbH and Aspen Aerogels Georgia, LLC.

Liquidity

During the nine months ended September 30, 2020, the Company incurred a net loss of \$15.6 million and used \$4.8 million of cash in operations. On February 18, 2020, the Company received net proceeds of \$14.8 million upon the completion of an underwritten public offering of the Company's common stock. On May 4, 2020, Aspen Aerogels Rhode Island, LLC received loan proceeds of \$3.7 million upon the execution of a promissory note pursuant to the Paycheck Protection Program (PPP) established by the Coronavirus Aid, Relief and Economic Security Act (CARES Act) and administered by the U.S. Small Business Administration (SBA) (see note 7). The Company had cash and cash equivalents of \$11.3 million, total debt of \$3.7 million and no outstanding borrowings under its revolving line of credit as of September 30, 2020 (see note 8). After giving effect to \$1.4 million of outstanding letters of credit, the amount available to the Company at September 30, 2020 under the revolving line of credit was \$8.1 million. The existing revolving line of credit matures on April 28, 2021.

The Company is increasing investment in the research and development of next-generation aerogel products and manufacturing process technologies. The Company is developing aerogel products and technologies for the electric vehicle market. The commercial potential for the Company's technology in the electric vehicle market is significant and could require the Company to hire additional personnel, incur additional operating expenses, and incur capital expenditures to expand aerogel manufacturing capacity, build an automated fabrication operation, and meet automotive quality system requirements, among other items.

The Company expects its existing cash balance and the amount anticipated to be available under the existing revolving line of credit will be sufficient to support current operating requirements and research and development activities. However, the Company plans to supplement its cash balance and available credit with debt financings, customer prepayments, technology licensing fees or equity financings to provide the capital necessary to fund the evolving commercial opportunity in the electric vehicle market and other strategic business opportunities.

Unaudited Interim Financial Information

The accompanying unaudited interim consolidated financial statements include the accounts of the Company and have been prepared in accordance with accounting principles generally accepted in the United States of America (U.S. GAAP) and with the instructions to Form 10-Q and Article 10 of Regulation S-X. Certain information and disclosures normally included in the consolidated financial statements prepared in accordance with U.S. GAAP have been condensed or omitted pursuant to such rules and regulations. As such, the information included in this Quarterly Report on Form 10-Q should be read in conjunction with the audited consolidated financial statements and accompanying notes in our Annual Report on Form 10-K for the year ended December 31, 2019 (the Annual Report), filed with the U.S. Securities and Exchange Commission on March 6, 2020.

In the opinion of the Company's management, the unaudited interim consolidated financial statements have been prepared on the same basis as the audited consolidated financial statements and include all adjustments that are of a normal recurring nature and necessary for the fair statement of the Company's financial position as of September 30, 2020 and the results of its operations and stockholders' equity for the three and nine months ended September 30, 2020 and 2019 and the cash flows for the nine month periods then ended. The Company has evaluated subsequent events through the date of this filing.

The Company's results of operations for the three and nine months ended September 30, 2020 are not necessarily indicative of the results to be expected for the year ending December 31, 2020 or any other period. In addition, the Company is uncertain of the ultimate duration and severity of the COVID-19 pandemic and recent global oil market volatility, and the impact they will have on the Company's results of operations for the year ending December 31, 2020 or any other period.

(2) Significant Accounting Policies

Principles of Consolidation

The accompanying consolidated financial statements, which have been prepared in accordance with U.S. GAAP, include the accounts of the Company and its wholly owned subsidiaries. All intercompany balances and transactions have been eliminated in consolidation.

Use of Estimates

The preparation of the consolidated financial statements requires the Company to make a number of estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. Significant items subject to such estimates and assumptions include allowances for doubtful accounts, sales returns and allowances, product warranty costs, inventory valuation, the carrying amount of property and equipment, stock-based compensation and deferred income taxes. The Company evaluates its estimates and assumptions on an on-going basis using historical experience and other factors, including current economic conditions, which are believed to be reasonable under the circumstances. Management adjusts such estimates and assumptions when facts and circumstances warrant. Illiquid credit markets, volatile equity markets and declines in business investment can increase the uncertainty inherent in such estimates and assumptions. As future events and their effects cannot be determined with precision, actual results could differ significantly from these estimates. Changes in these estimates resulting from continuing changes in the economic environment will be reflected in the financial statements in future periods.

Cash and Cash Equivalents

Cash equivalents include short-term, highly liquid instruments, which consist of money market accounts. All cash and cash equivalents are maintained with major financial institutions in North America. Deposits with these financial institutions may exceed the amount of insurance provided on such deposits; however, these deposits typically may be redeemed upon demand and, therefore, bear minimal risk.

Concentration of Credit Risk

Financial instruments, which potentially expose the Company to concentrations of credit risk, consist principally of accounts receivable. The Company maintains an allowance for doubtful accounts based on its assessment of the collectability of accounts receivable. The Company reviews the allowance for doubtful accounts quarterly. During the nine months ended September 30, 2020, the Company recorded a charge for estimated customer uncollectible accounts receivable of \$0.2 million. The Company did not record a charge for uncollectible accounts receivable during the nine months ended September 30, 2019.

Revenue Recognition

The Company recognizes revenue in accordance with Accounting Standards Codification 606, Revenue from Contracts with Customers (ASC 606). See note 3 for further details.

Leases

On January 1, 2019, the Company adopted Accounting Standards Update (ASU) 2016-02, Leases (Topic 842). See note 9 for further details.

Stock-based Compensation

Stock-based compensation expense is measured at the grant date based on the fair value of the award. Expense is recognized on a straight-line basis over the requisite service period for all awards with service conditions. For performance-based awards, the grant date fair value is recognized as expense when the condition is probable of being achieved and then on a graded basis over the requisite service period. The Company uses the Black-Scholes option-pricing model to determine the fair value of service-based option awards, which requires a number of complex and subjective assumptions including fair value of the underlying security, the expected volatility

of the underlying security, a risk-free interest rate and the expected term of the option. The fair value of restricted stock and restricted stock unit grants is determined using the closing trading price of the Company's common stock on the date of grant. The fair value of awards containing market conditions is determined using a Monte Carlo simulation model based upon the nature of the conditions, the expected volatility of the underlying security, and other relevant factors.

During the nine months ended September 30, 2020, the Company granted 165,430 restricted common stock units (RSUs) with a grant date fair value of \$1.3 million and non-qualified stock options (NSOs) to purchase 617,627 shares of common stock with a grant date fair value of \$2.4 million to employees under the 2014 Employee, Director, and Consultant Equity Incentive Plan (the 2014 Equity Plan). The RSUs and NSOs granted to employees will vest over a three-year period. During the nine months ended September 30, 2020, the Company also granted 45,066 shares of restricted common stock with a grant date fair value of \$0.3 million and NSOs to purchase 58,902 shares of common stock with a grant date fair value of \$0.2 million to its non-employee directors under the 2014 Equity Plan. The restricted common stock and NSOs granted to non-employee directors will vest upon the earlier of the date that is the one-year anniversary of the grant or the day prior to the Company's annual meeting of stockholders to be held in 2021.

Stock-based compensation is included in cost of revenue or operating expenses, as applicable, and consists of the following:

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2020	2019	2020	2019
	(In thousands)			
Cost of product revenue	\$ 98	\$ 125	\$ 544	\$ 365
Research and development expenses	169	130	482	374
Sales and marketing expenses	179	168	524	461
General and administrative expenses	545	588	1,440	1,685
Total stock-based compensation	<u>\$ 991</u>	<u>\$ 1,011</u>	<u>\$ 2,990</u>	<u>\$ 2,885</u>

Pursuant to the "evergreen" provisions of the 2014 Equity Plan, the number of shares of common stock authorized for issuance under the plan automatically increased by 486,050 shares to 7,974,980 shares effective January 1, 2020.

As of September 30, 2020, 4,536,565 shares of common stock were reserved for issuance upon the exercise or vesting of outstanding stock-based awards granted under the 2014 Equity Plan. In addition, as of September 30, 2020, 81,663 shares of common stock were reserved for issuance upon the exercise of outstanding stock options granted under the Company's 2001 Equity Incentive Plan, as amended (the 2001 Equity Plan). Any cancellations or forfeitures of the options outstanding under the 2001 Equity Plan will result in the shares reserved for issuance upon exercise of such options becoming available for grant under the 2014 Equity Plan. As of September 30, 2020, the Company has either reserved in connection with statutory tax withholdings or issued a total of 2,546,810 shares under the 2014 Equity Plan. As of September 30, 2020, there were 809,942 shares of common stock available for future grant under the 2014 Equity Plan.

Net Loss per Share

The Company calculates net loss per share of common stock based on the weighted-average number of shares of common stock outstanding during each period. Potential common stock equivalents are determined using the treasury stock method. The weighted-average number of shares of common stock included in the computation of diluted net loss gives effect to all potentially dilutive common equivalent shares, including outstanding stock options and RSUs. Common equivalent shares are excluded from the computation of diluted net loss per share if their effect is antidilutive.

Segments

Operating segments are identified as components of an enterprise about which separate, discrete financial information is available for evaluation by the chief operating decision maker in making decisions on how to allocate resources and assess performance. The Company's chief operating decision maker is the Chief Executive Officer. The Company's chief operating decision maker reviews consolidated operating results to make decisions about allocating resources and assessing performance for the entire Company. The Company views its operations and manages its business as one operating segment.

Information about the Company's total revenues, based on shipment destination or services location, is presented in the following table:

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2020	2019	2020	2019
	(In thousands)			
Revenue:				
U.S.	\$ 9,736	\$ 15,191	\$ 31,501	\$ 41,415
International	14,459	20,234	45,754	51,455
Total	<u>\$ 24,195</u>	<u>\$ 35,425</u>	<u>\$ 77,255</u>	<u>\$ 92,870</u>

Warranty

The Company provides warranties for its products and records the estimated cost within cost of revenue in the period that the related revenue is recorded. The Company's standard warranty period extends to one year from the date of shipment. This standard warranty provides that the Company's products will be free from defects in material and workmanship, and will, under normal use, conform to the specifications for the product.

The Company's products may be utilized in systems that involve new technical demands and new configurations. Accordingly, the Company regularly reviews and assesses whether warranty reserves should be recorded in the period the related revenue is recorded. For an initial shipment of product for use in a system with new technical demands or new configurations and where the Company is unsure of meeting the customer's specifications, the Company will defer the recognition of product revenue and related costs until written customer acceptance is obtained.

The Company did not record any warranty expense during the nine months ended September 30, 2020 and 2019. As of September 30, 2020, the Company had satisfied all warranty claims.

Recently Issued Accounting Standards

From time to time, new accounting pronouncements are issued by the Financial Accounting Standards Board (FASB) or other standard setting bodies. Recently issued standards typically do not require adoption until a future effective date. Prior to their effective date, the Company evaluates the pronouncements to determine the potential effects of adoption to its consolidated financial statements.

Standards Implemented Since December 31, 2019

The Company has not implemented any accounting standards that had a material impact on its consolidated financial statements during the nine months ended September 30, 2020.

Standards to be Implemented

The Company believes that the impact of recently issued accounting standards that are not yet effective will not have a material impact on its consolidated financial statements.

(3) Revenue from Contracts with Customers

Revenue Recognition

Revenue is recognized when a customer obtains control of promised goods or services in an amount that reflects the consideration which the entity expects to receive in exchange for those goods or services. To determine revenue recognition for arrangements within the scope of ASC 606, the Company performs the following five steps: (i) identification of the contract with a customer; (ii) identification of the performance obligations in the contract; (iii) determination of the transaction price; (iv) allocation of the transaction price to the separate performance obligations in the contract; and (v) recognition of the revenue associated with performance obligations as they are satisfied. The Company applies the five-step model to contracts when it is probable that the Company will collect the consideration it is entitled to in exchange for the goods or services it transfers to the customer. At contract inception, once the contract is determined to be within the scope of ASC 606, the Company assesses the goods or services promised within each contract and determines those that are performance obligations, and assesses whether each promised good or service is distinct. If the contract contains a single performance obligation, the entire transaction price is allocated to the single performance

obligation. Contracts that contain multiple performance obligations require an allocation of the transaction price based on the estimated relative standalone-selling prices of the promised products or services underlying each performance obligation. The Company determines standalone-selling prices based on the price at which the performance obligation is sold separately. If the standalone-selling price is not observable through past transactions, the Company estimates the standalone-selling price taking into account available information such as market conditions and internally approved pricing guidelines related to the performance obligations. The Company then recognizes as revenue the amount of the transaction price that is allocated to the respective performance obligation when (or as) the performance obligation is satisfied.

When determining the transaction price of a contract, an adjustment is made if payment from a customer occurs either significantly before or significantly after performance, resulting in a significant financing component. Applying the practical expedient in paragraph ASC 606-10-32-18, the Company does not assess whether a significant financing component exists if the period between when the Company performs its obligations under the contract and when the customer pays is one year or less. The Company did not have any contracts outstanding at December 31, 2019 and did not enter into any contracts during the nine months ended September 30, 2020 that contained a significant financing component.

The Company records deferred revenue for product sales when (i) the Company has delivered products but other revenue recognition criteria have not been satisfied or (ii) payments have been received in advance of the completion of required performance obligations.

Shipping and Handling Costs

Shipping and handling costs associated with outbound freight after control over a product has transferred to a customer are accounted for as fulfillment costs and are included in the cost of product revenue. The associated amount of revenue recognized includes the consideration to which the Company expects to be entitled to receive in exchange for incurring these shipping and handling costs.

Product Revenue

The Company generally enters into contracts containing one type of performance obligation. The Company recognizes product revenue when the performance obligation is satisfied, which is generally upon delivery according to contractual shipping terms within customer purchase orders.

The Company also enters into rebate agreements with certain customers. These agreements may be considered an additional performance obligation of the Company or variable consideration within a contract. Rebates are recorded as a reduction of revenue in the period the related product revenue is recognized. A corresponding liability is recorded as a component of deferred revenue on the consolidated balance sheets. These arrangements are primarily based on the customer attaining contractually specified sales volumes.

The Company estimates the amount of its product sales that may be returned by its customers and records this estimate as a reduction of revenue in the period the related product revenue is recognized. The Company currently estimates product return liabilities using historical rates of return, current quarter credit sales, and specific items of exposure on a contract-by-contract basis. Sales return reserves were approximately \$0.1 million at both September 30, 2020 and December 31, 2019.

Subsea Projects

The Company manufactures and sells products that are designed for pipe-in-pipe applications in subsea oil production and are typically customized to meet customer specifications. Subsea products typically have no alternative use and contain an enforceable right to payment. Customer invoicing terms for subsea products are typically based on certain milestones within the production and delivery schedule. Under the provisions of ASC 606, the Company recognizes revenue at a point in time when transfer of control of the products is passed to the customer, or over time utilizing the input method. The timing of revenue recognition is assessed on a contract-by-contract basis. During the nine months ended September 30, 2020 and 2019, the Company recognized revenue of \$8.3 million and \$14.4 million, respectively, in connection with subsea projects.

Research Services

The Company performs research services under contracts with various government agencies and other institutions. These contracts generally have one type of performance obligation associated with the provision of research services including certain licenses to any resulting intellectual property. The Company records revenue using the percentage-of-completion method in two ways: (1) for firm-fixed-price contracts, the Company accrues that portion of the total contract price that is allocable on the basis of the Company's estimates of costs incurred to date to total contract costs; and (2) for cost-plus-fixed-fee contracts, the Company records

revenue that is equal to total payroll cost incurred times a stated factor plus reimbursable expenses, to a stated upper limit. The primary cost under the Company's research service contracts is the labor effort expended in completing the research. Typically, the only deliverable, other than the labor hours expended, is reporting research results to the customer or delivery of research grade aerogel products. Because the input measure of labor hours expended is also reflective of the output measure, it is a reliable means to measure the extent of progress toward completion. Revisions in cost estimates and fees during the course of the contract are reflected in the accounting period in which the facts that require the revisions become known. Contract costs and rates used to allocate overhead to contracts are subject to audit by the respective contracting government agency. Adjustments to revenue as a result of audit are recorded within the period they become known. To date, adjustments to revenue as a result of contracting agency audits have been insignificant.

Disaggregation of Revenue

In the following tables, revenue is disaggregated by primary geographical region and source of revenue:

	Three Months Ended September 30,					
	2020			2019		
	U.S.	International	Total	U.S.	International	Total
(In thousands)						
Geographical region						
Asia	\$ —	\$ 9,617	\$ 9,617	\$ —	\$ 10,535	\$ 10,535
Canada	—	25	25	—	5,372	5,372
Europe	—	4,635	4,635	—	3,726	3,726
Latin America	—	182	182	—	601	601
U.S.	9,736	—	9,736	15,191	—	15,191
Total revenue	<u>\$ 9,736</u>	<u>\$ 14,459</u>	<u>\$ 24,195</u>	<u>\$ 15,191</u>	<u>\$ 20,234</u>	<u>\$ 35,425</u>
Source of revenue						
Product revenue	\$ 8,612	\$ 12,307	\$ 20,919	\$ 14,812	\$ 18,286	\$ 33,098
Subsea projects	868	2,152	3,020	—	1,948	1,948
Research services	256	—	256	379	—	379
Total revenue	<u>\$ 9,736</u>	<u>\$ 14,459</u>	<u>\$ 24,195</u>	<u>\$ 15,191</u>	<u>\$ 20,234</u>	<u>\$ 35,425</u>

	Nine Months Ended September 30,					
	2020			2019		
	U.S.	International	Total	U.S.	International	Total
(In thousands)						
Geographical region						
Asia	\$ —	\$ 33,373	\$ 33,373	\$ —	\$ 25,044	\$ 25,044
Canada	—	715	715	—	7,278	7,278
Europe	—	9,590	9,590	—	16,713	16,713
Latin America	—	2,076	2,076	—	2,420	2,420
U.S.	31,501	—	31,501	41,415	—	41,415
Total revenue	<u>\$ 31,501</u>	<u>\$ 45,754</u>	<u>\$ 77,255</u>	<u>\$ 41,415</u>	<u>\$ 51,455</u>	<u>\$ 92,870</u>
Source of revenue						
Product revenue	\$ 29,039	\$ 39,394	\$ 68,433	\$ 35,727	\$ 40,585	\$ 76,312
Subsea projects	1,979	6,360	8,339	3,557	10,870	14,427
Research services	483	—	483	2,131	—	2,131
Total revenue	<u>\$ 31,501</u>	<u>\$ 45,754</u>	<u>\$ 77,255</u>	<u>\$ 41,415</u>	<u>\$ 51,455</u>	<u>\$ 92,870</u>

Contract Balances

The following table presents changes in the Company's contract assets and contract liabilities during the nine months ended September 30, 2020:

	Balance at December 31, 2019	Additions	Deductions	Balance at September 30, 2020
	(In thousands)			
Contract assets				
Subsea projects	\$ 2,811	\$ 8,254	\$ (8,659)	\$ 2,406
Research services	172	250	(233)	189
Total contract assets	<u>\$ 2,983</u>	<u>\$ 8,504</u>	<u>\$ (8,892)</u>	<u>\$ 2,595</u>
Contract liabilities				
Deferred revenue				
Product revenue	\$ 4,991	\$ 997	\$ (4,122)	\$ 1,866
Subsea projects	491	4,387	(4,469)	409
Research services	138	94	(232)	—
Prepayment liability	9,786	—	(218)	9,568
Total contract liabilities	<u>\$ 15,406</u>	<u>\$ 5,478</u>	<u>\$ (9,041)</u>	<u>\$ 11,843</u>

During the nine months ended September 30, 2020, the Company recognized \$4.6 million of revenue that was included in deferred revenue at the beginning of the period.

A contract asset is recorded when the Company satisfies a performance obligation by transferring a promised good or service and has earned the right to consideration from its customer. These assets may represent a conditional or unconditional right to consideration and are included within accounts receivable on the consolidated balance sheets.

A contract liability is recorded when consideration is received, or such consideration is unconditionally due, from a customer prior to transferring goods or services under the terms of the contract. Contract liabilities are recognized as revenue after control of the products or services is transferred to the customer and all revenue recognition criteria have been met.

(4) Inventories

Inventories consist of the following:

	September 30, 2020	December 31, 2019
	(In thousands)	
Raw materials	\$ 4,847	\$ 4,334
Finished goods	4,580	4,434
Total	<u>\$ 9,427</u>	<u>\$ 8,768</u>

(5) Property, Plant and Equipment, Net

Property, plant and equipment consist of the following:

	September 30, 2020	December 31, 2019	Useful life
	(In thousands)		
Construction in progress	\$ 977	\$ 1,309	—
Buildings	24,016	24,016	30 years
Machinery and equipment	124,681	122,485	3-10 years
Computer equipment and software	8,737	8,556	3 years
Total	158,411	156,366	
Accumulated depreciation	(110,312)	(102,749)	
Property, plant and equipment, net	<u>\$ 48,099</u>	<u>\$ 53,617</u>	

Depreciation expense was \$7.7 million for both the nine months ended September 30, 2020 and 2019.

(6) Accrued Expenses

Accrued expenses consist of the following:

	September 30, 2020	December 31, 2019
	(In thousands)	
Employee compensation	\$ 2,401	\$ 6,472
Other accrued expenses	1,680	1,585
Total	<u>\$ 4,081</u>	<u>\$ 8,057</u>

(7) Debt

On May 1, 2020, Aspen Aerogels Rhode Island, LLC (Borrower) executed a promissory note (Note) in favor of Northeast Bank to receive an unsecured loan in the principal amount of \$3,685,800 (the PPP Loan) pursuant to the Paycheck Protection Program (PPP) established by the CARES Act, as amended by the Paycheck Protection Program Flexibility Act (Flexibility Act), and administered by the SBA. The Borrower conferred with representatives of the SBA prior to finalizing the PPP Loan. The PPP Loan was subsequently sold by Northeast Bank to The Loan Source, Inc. (PPP Investor), a secondary market investor.

The PPP Loan carries an interest rate of 1% per year and matures two years from the date of the Note. The PPP Loan indebtedness may be forgiven in whole or in part upon application by the Borrower to the PPP Investor. The PPP Investor will determine to what extent the PPP Loan is eligible for forgiveness, subject to SBA guidelines and other regulations, based on the use of loan proceeds for payroll costs, payment of interest on covered mortgage obligations, rent and utility costs over either an eight-week or 24-week period, at the Borrower's option, following the Borrower's receipt of the loan proceeds. Upon the Borrower's application for forgiveness, the SBA will review the Borrower's eligibility, use of proceeds and other certifications in connection with the application for the PPP Loan. Upon such review, the SBA may approve or deny the Borrower's loan forgiveness application, in whole or part. As of September 30, 2020, the Borrower had not applied for forgiveness.

If the Borrower has not applied for forgiveness within ten months from the end of the 24-week period following receipt of the loan proceeds, the Borrower shall then be required make payments of principal and accrued interest in equal monthly installments over the remaining term of the loan. In addition, the Flexibility Act permits the Borrower and the PPP Investor to mutually agree to extend the term of the PPP Loan to five years from the date of the Note. The Borrower may repay the PPP Loan at any time without penalty.

While the Borrower is not required to apply for forgiveness of the PPP Loan, upon application for forgiveness, the Borrower may not receive forgiveness of the PPP Loan in whole or in part. In addition, the amount of potential loan forgiveness may be reduced if the Borrower fails to maintain employee and salary levels during the applicable eight-week or 24-week period following receipt of the loan proceeds. If the Borrower applies for forgiveness, and the PPP Loan is not forgiven in whole or only forgiven in part, the Borrower shall then be required to immediately begin making payments of principal and accrued interest in equal monthly installments over the remaining term of the loan for any post-forgiveness balance outstanding.

The Note contains customary events of default relating to, among other things, payment defaults, breaches of representations and warranties, and defaults under any loan or agreement with another debtor, including the Company's credit facility with SVB, to the extent the PPP Investor believes such default may materially affect the Borrower's ability to repay the PPP Loan. The occurrence of an event of default, if not cured, may result in the Borrower's repayment of the PPP Loan prior to maturity.

The Borrower has used the proceeds of the PPP Loan to support ongoing operations and to sustain staffing levels in its East Providence, Rhode Island manufacturing facility despite the unfavorable impact of the COVID-19 pandemic and volatile energy markets on its business.

Long-term debt consists of the following:

	September 30, 2020	December 31, 2019
	(In thousands)	
Long-term debt, principal	\$ 3,686	\$ —
Current portion of long-term debt	(367)	—
Debt issuance costs, net of accumulated amortization	(21)	—
Long-term debt	<u>\$ 3,298</u>	<u>\$ —</u>

The schedule of required principal payments remaining on long-term debt outstanding as of September 30, 2020 is as follows:

Year	Principal Payments (In thousands)
2020 (excluding the nine months ended September 30, 2020)	\$ —
2021	1,609
2022	2,077
Total principal payments	<u>\$ 3,686</u>

(8) Commitments and Contingencies

Thermal Barrier Contract

The Company is party to a contract with a major U.S. automotive original equipment manufacturer (OEM) to supply fabricated, multi-part thermal barriers (Barriers) for use in the battery system of its next-generation electric vehicles (Contract). Pursuant to the Contract, the Company is obligated to supply Barriers at fixed annual prices and at volumes to be specified by the OEM up to a daily maximum quantity through the term of the agreement, which expires on September 1, 2026. While the OEM has agreed to purchase its requirement for Barriers at locations to be designated from time to time from the Company, it has no obligation to purchase any minimum quantity of Barriers under the Contract. In addition, the OEM may terminate the Contract any time and for any or no reason. All other terms of the Contract are generally consistent with the OEM's standard purchase terms, including customary quality and warranty provisions.

BASF Supply Agreement

The Company is party to a supply agreement, as amended, with BASF Polyurethanes GmbH (BASF) (the Supply Agreement) and a joint development agreement with BASF SE (the JDA). Pursuant to the Supply Agreement, the Company will sell exclusively to BASF certain of the Company's products at annual volumes to be specified by BASF, subject to certain volume limits. However, BASF has no obligation to purchase products under the Supply Agreement. The Supply Agreement will terminate on December 31, 2027 with respect to the Company's Spaceloft A2 product and December 31, 2028 with respect to a new product developed under the JDA. Upon the expiration of the Supply Agreement with respect to each product, the Company will be subject to a post-termination supply commitment for an additional two years. The JDA is designed to facilitate collaboration by the parties on the development and commercialization of new products.

In addition, BASF, in its sole discretion, may make prepayments to the Company in the aggregate amount of up to \$22.0 million during the term of the Supply Agreement. These prepayment obligations are secured by a security interest in real estate, plant and equipment at the Company's Rhode Island facility and a license to certain intellectual property. BASF made a prepayment in the amount of \$5.0 million to the Company in 2018 (the 2018 Prepayment). As of January 1, 2019, 25.3% of any amounts that the Company invoices for Spaceloft A2 sold to BASF will be credited against the outstanding balance of the 2018 prepayment. If any of the 2018 Prepayment remains uncredited as of December 31, 2021, BASF may require that the Company repay the uncredited amount to BASF.

Pursuant to the first addendum to the Supply Agreement, on January 30, 2019, BASF made an additional prepayment in the amount of \$5.0 million to the Company (the 2019 Prepayment). As of January 1, 2020, 50.0% of any amounts that the Company invoices for the newly developed product sold to BASF will be credited against the outstanding balance of the 2019 Prepayment. After December 31, 2022, BASF may require that the Company credit an additional 24.7% of any amounts invoiced by the Company for Spaceloft A2 product sold to BASF against the outstanding balance of the 2019 Prepayment, if any, or may require that the Company repay the uncredited amount of the 2019 Prepayment to BASF in full.

As of September 30, 2020, the Company had received \$10.0 million in prepayments from BASF and applied approximately \$0.2 million of credits against amounts invoiced. The prepayments are recorded on the balance sheet as a prepayment liability, net of the current portion of \$0.3 million at both September 30, 2020 and December 31, 2019, which is included within deferred revenue. The amounts and terms of additional prepayment installments, if any, are subject to negotiation between the Company and BASF.

Revolving Line of Credit

The Company is party to an Amended and Restated Loan and Security Agreement with Silicon Valley Bank (Loan Agreement). On March 3, 2020, the Loan Agreement was amended to extend the maturity date of the revolving credit facility to April 28, 2021. On September 25, 2020, the Loan Agreement was further amended to revise, among other things, the minimum Adjusted EBITDA financial covenant.

Under the revolving credit facility, the Company is permitted to borrow a maximum of \$20.0 million, subject to continued covenant compliance and borrowing base requirements. At the Company's election, the interest rate applicable to borrowings under the revolving credit facility may be based on prime rate or LIBOR, subject to a minimum rate of 4.00% per annum. Prime rate-based rates vary from prime rate plus 0.75% per annum to prime rate plus 2.00% per annum, while LIBOR-based rates vary from LIBOR plus 3.75% per annum to LIBOR plus 4.25% per annum. In addition, the Company is required to pay a monthly unused revolving line of credit facility fee of 0.5% per annum of the average unused portion of the revolving credit facility.

Under the Loan Agreement, the Company is required to comply with both non-financial and financial covenants, including a minimum Adjusted EBITDA covenant, as defined. At September 30, 2020, the Company was in compliance with all such covenants. Obligations under the Loan Agreement are secured by a security interest in all assets of the Company, including those at the East Providence facility, except for certain exclusions. The Company intends to extend or replace the facility prior to its maturity.

At September 30, 2020 and December 31, 2019, the Company had zero dollars and \$3.1 million, respectively, drawn on the revolving credit facility. In addition, the Company has been required to provide letters of credit to secure obligations under certain commercial contracts and other obligations. The Company had outstanding letters of credit backed by the revolving credit facility of \$1.4 million and \$0.9 million at September 30, 2020 and December 31, 2019, respectively, which reduce the funds otherwise available to the Company under the facility.

At September 30, 2020, the amount available to the Company under the revolving credit facility was \$8.1 million after giving effect to \$1.4 million of outstanding letters of credit.

Federal, State and Local Environmental Regulations

The Company is subject to federal, state and local laws and regulations relating to the environment. These laws generally provide for control of pollutants released into the environment and require responsible parties to undertake remediation. Penalties may be imposed for noncompliance.

The Company is currently in technical discussions with the U.S. Environmental Protection Agency (EPA) in connection with the EPA's notice of potential violation and opportunity to confer that the Company received regarding the applicability of certain Resource Conservation and Recovery Act (RCRA) provisions to certain aspects of its manufacturing unit operations. The EPA notice is in connection with the EPA's RCRA Compliance Evaluation Inspection of the Company's East Providence, Rhode Island manufacturing facility in May 2019. While the Company believes its environmental compliance program is consistent with the RCRA statutory and regulatory framework, the EPA may decide otherwise, find the Company in violation, assess penalties and compel compliance that may require capital expenditure and resource allocation that may have a material impact on the Company. However, at present, the EPA has not made any determination as to any violation and the Company does not know when the EPA may make any determination. As such, the Company has determined that while it is possible it will incur expense in this regard, whether any expense will be incurred, its nature, or any amount is not estimable as of September 30, 2020.

Litigation

The Company is, from time to time, a party to litigation that arises in the normal course of its business operations. See Part II, Item 1 "Legal Proceedings" of this Quarterly Report on Form 10-Q for a description of certain of the Company's current legal proceedings. The Company is not presently a party to any litigation for which it believes a loss is probable requiring an amount to be accrued or a possible loss contingency requiring disclosure.

(9) Leases

The Company leases office and warehouse space in Northborough, Massachusetts and East Providence, Rhode Island under operating leases. Under these agreements, the Company is obligated to pay annual rent, real estate taxes, and certain other operating expenses. The Company also leases equipment under operating leases. The Company's operating leases expire at various dates through 2026.

On January 1, 2019, the Company adopted ASU 2016-02 which modifies the accounting for leases and requires that all leases be recorded on the consolidated balance sheets as assets and liabilities. The Company adopted this standard using the modified retrospective transition approach with the effective date as the date of initial application. The Company also elected the package of practical expedients under the new standard, which permits the Company to not reassess prior conclusions about lease identification, lease classification, and initial direct costs. In addition, the Company elected the short-term lease recognition exemption under which the Company will not recognize right-of-use (ROU) assets or lease liabilities for all leases that qualify. The Company also elected the practical expedient to not separate non-lease components from the associated lease components for all of its equipment leases.

The Company determines if an arrangement is a lease at inception. ROU assets represent the Company's right to use an underlying asset for the lease term and lease liabilities represent the Company's payment obligations under the lease. Operating lease ROU assets and liabilities are recognized based on the present value of lease payments over the lease term. To measure its lease liabilities, the Company uses its incremental borrowing rate or the rate implicit in the lease, if available. The Company calculates its incremental borrowing rate using a synthetic credit rating analysis based on Moody's Building Materials Industry Rating Methodology. ROU assets also include any direct costs and prepaid lease payments but exclude any lease incentives received. The Company's lease terms may include options to extend or terminate the lease when it is reasonably certain that the Company will exercise that option. Lease expense for lease payments is recognized on a straight-line basis over the lease term.

The Company elected the short-term lease recognition exemption for all leases that qualify. For leases that qualify for this exemption, the Company does not recognize ROU assets or lease liabilities. For lease agreements with lease and non-lease components, the Company accounts for each component separately. However, in the case of equipment leases, the Company accounts for lease and non-lease components as a single component.

Upon adoption of ASU 2016-02 on January 1, 2019, the Company recognized operating lease liabilities of approximately \$6.0 million with corresponding ROU assets of approximately \$4.6 million. Additionally, the Company derecognized deferred rent liabilities of \$1.4 million.

Maturities of operating lease liabilities at September 30, 2020 are as follows:

Year	Operating Leases (In thousands)
2020 (excluding the nine months ended September 30, 2020)	\$ 376
2021	1,331
2022	1,249
2023	1,193
2024	684
Thereafter	1,049
Total lease payments	5,882
Less imputed interest	(981)
Total lease liabilities	\$ 4,901

The Company incurred operating lease costs of \$1.1 million and \$1.2 million during the nine months ended September 30, 2020 and 2019, respectively. Cash payments related to operating lease liabilities were \$1.1 million during both the nine months ended September 30, 2020 and 2019.

At September 30, 2020, the weighted average remaining lease term for operating leases was 4.8 years. At September 30, 2020, the weighted average discount rate for operating leases was 7.7%.

(10) Other Long-Term Liabilities

Other long-term liabilities of \$0.6 million consist of the Company's employer payroll tax obligation for the period from March 27, 2020 to September 30, 2020 on which payment was deferred pursuant to the provisions of the CARES Act. The Company is required to remit 50 percent of the deferred tax balance as of December 31, 2020 on or before December 31, 2021 and the remaining 50 percent on or before December 31, 2022.

(11) Net Loss Per Share

The computation of basic and diluted net loss per share consists of the following:

	Three Months Ended		Nine Months Ended	
	September 30,		September 30,	
	2020	2019	2020	2019
(In thousands, except share and per share data)				
Numerator:				
Net loss	\$ (6,753)	\$ (2,289)	\$ (15,620)	\$ (13,609)
Denominator:				
Weighted average shares outstanding, basic and diluted	26,728,205	24,171,811	26,150,236	24,074,565
Net loss per share, basic and diluted	\$ (0.25)	\$ (0.09)	\$ (0.60)	\$ (0.57)

Potentially dilutive common shares that were excluded from the computation of diluted net loss per share because they were anti-dilutive consist of the following:

	Three and Nine Months Ended	
	September 30,	
	2020	2019
Common stock options	3,918,669	3,683,858
Restricted common stock units	699,559	1,105,415
Restricted common stock awards	123,191	128,453
Total	4,741,419	4,917,726

In the table above, anti-dilutive shares consist of those common stock equivalents that have (i) an exercise price above the average stock price for the period or (ii) related average unrecognized stock compensation expense sufficient to buy back the entire amount of shares. The Company excludes the shares issued in connection with restricted stock awards from the calculation of basic weighted average common shares outstanding until the restrictions lapse.

(12) Income Taxes

The Company incurred net operating losses and recorded a full valuation allowance against net deferred tax assets for all periods presented. Accordingly, the Company has not recorded a provision for federal or state income taxes.

(13) Subsequent Events

The Company has evaluated subsequent events through November 5, 2020, the date of issuance of the consolidated financial statements for the three and nine months ended September 30, 2020.

On November 5, 2020, the Company entered into a sales agreement with B. Riley Securities, Inc. (B. Riley), as sales agent, pursuant to which the Company may offer and sell, from time to time, through B. Riley, shares of the Company's common stock, having an aggregate offering price of up to \$33,871,250.

Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations.

The following information should be read in conjunction with the unaudited financial information and the notes thereto included in this Quarterly Report on Form 10-Q and the audited financial information and the notes thereto included in the Annual Report on Form 10-K for the year ended December 31, 2019, filed with the U.S. Securities and Exchange Commission (SEC) on March 6, 2020, which we refer to as the Annual Report.

Certain matters discussed in this Quarterly Report on Form 10-Q may be deemed to be forward-looking statements that involve risks and uncertainties. We make such forward-looking statements pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995 and other federal securities laws. In this Quarterly Report on Form 10-Q, words such as "may," "will," "anticipate," "estimate," "expects," "projects," "intends," "plans," "believes" and similar expressions (as well as other words or expressions referencing future events, conditions or circumstances) are intended to identify forward-looking statements.

Our actual results and the timing of certain events may differ materially from the results discussed, projected, anticipated, or indicated in any forward-looking statements. We caution you that forward-looking statements are not guarantees of future performance and that our actual results of operations, financial condition and liquidity, and the development of the industry in which we operate may differ materially from the forward-looking statements contained in this Quarterly Report on Form 10-Q. In addition, even if our results of operations, financial condition and liquidity, and the development of the industry in which we operate are consistent with the forward-looking statements contained in this Quarterly Report on Form 10-Q, they may not be predictive of results or developments in future periods.

The following information and any forward-looking statements should be considered in light of factors discussed elsewhere in this Quarterly Report on Form 10-Q and under "Risk Factors" in Item 1A of the Annual Report.

We caution readers not to place undue reliance on any forward-looking statements made by us, which speak only as of the date they are made. We disclaim any obligation, except as specifically required by law and the rules of the SEC, to publicly update or revise any such statements to reflect any change in our expectations or in events, conditions or circumstances on which any such statements may be based, or that may affect the likelihood that actual results will differ from those set forth in the forward-looking statements.

You should read the following discussion and analysis of financial condition and results of operations together with Part I Item 1 "Financial Statements," which includes our financial statements and related notes, elsewhere in this Quarterly Report on Form 10-Q.

Investors and others should note that we routinely use the Investors section of our website to announce material information to investors and the marketplace. While not all of the information that we post on the Investors section of our website is of a material nature, some information could be deemed to be material. Accordingly, we encourage investors, the media, and others interested in us to review the information that we share on the Investors section of our website, <https://www.aerogel.com>.

Overview

We design, develop and manufacture innovative, high-performance aerogel insulation used primarily in the energy infrastructure and building materials markets. We believe our aerogel blankets deliver the best thermal performance of any widely used insulation product available on the market today and provide a combination of performance attributes unmatched by traditional insulation materials. Our end-use customers select our products where thermal performance is critical and to save money, improve resource efficiency, enhance sustainability, preserve operating assets and protect workers.

Our insulation is used by oil producers and the owners and operators of refineries, petrochemical plants, liquefied natural gas facilities, power generating assets and other energy infrastructure. Our Pyrogel and Cryogel product lines have undergone rigorous technical validation by industry leading end-users and achieved significant market adoption. We also derive product revenue from the building materials and other end markets. Customers in these markets use our products for applications as diverse as wall systems, military and commercial aircraft, trains, buses, appliances, apparel, footwear and outdoor gear. We are also developing a set of products that enable solutions to thermal runaway challenges in batteries used in electric vehicles. As we continue to enhance our aerogel technology platform, we believe we will have additional opportunities to address high value applications in the global insulation market, the electric vehicle market and in a diverse set of new markets.

We generate product revenue through the sale of our line of aerogel blankets. We market and sell our products primarily through a sales force based in North America, Europe and Asia. The efforts of our sales force are supported by a small number of sales

consultants with extensive knowledge of a particular market or region. Our sales force is responsible for establishing and maintaining customer and partner relationships, delivering highly technical information and ensuring high-quality customer service.

Our salespeople work directly with end-use customers and engineering firms to promote the qualification, specification and acceptance of our products. We also rely on an existing and well-established channel of qualified insulation distributors and contractors in more than 50 countries around the world to ensure rapid delivery of our products and strong end-user support. Our salespeople also work to educate insulation contractors about the technical and operating cost advantages of our aerogel blankets.

We also perform research services under contracts with various agencies of the U.S. government, including the Department of Defense and the Department of Energy, and other institutions. In late 2019, we decided to cease efforts to secure additional funded research contracts and to wind down our existing contract research activities. This decision reflected our desire to focus our research and development resources on initiatives to improve the profitability of our existing business and on efforts to develop new products and next-generation technology with application in new, high value markets.

We manufacture our products using our proprietary technology at our facility in East Providence, Rhode Island. We have operated the East Providence facility since 2008 and had increased our annual capacity through 2017 to 50 million square feet of aerogel blankets. During 2018, we initiated a series of projects, which we refer to as EP20, designed to increase this capacity to 60 million square feet of aerogel blankets by the end of 2020. As of September 30, 2020, we had increased our annual capacity to 55 million square feet of aerogel blankets as a result of this initiative. We have delayed the implementation of our next-generation chemistry and process technologies during 2020 and currently expect to achieve our EP20 goals by the end of 2021.

We are engaged in a strategic partnership with BASF to develop and commercialize products for the building materials and other markets. The strategic partnership includes a supply agreement governing the exclusive sale of specified products to BASF and a joint development agreement targeting innovative products and technologies. BASF has no obligation to purchase any products under the supply agreement. Pursuant to the supply agreement, BASF may, in its sole discretion, make prepayments to us in the aggregate amount of up to \$22.0 million during the term of the agreement. We may repay the prepayments to BASF at any time in whole or in part for any reason.

BASF made a prepayment to us of \$5.0 million during 2018. As of January 1, 2019, 25.3% of any amounts that we invoice for Spaceloft A2 sold to BASF will be credited against the outstanding balance of the 2018 prepayment. If any amount of the 2018 prepayment remains uncredited at December 31, 2021, BASF may require that we repay the uncredited amount to BASF. In January 2019, BASF made an additional prepayment to us of \$5.0 million. As of January 1, 2020, 50% of any amounts that we invoice for a newly developed product sold to BASF will be credited against the outstanding balance of the 2019 prepayment. After December 31, 2022, BASF may require that we credit 24.7% of any amounts we invoice for Spaceloft A2 sold to BASF against the outstanding balance of the 2019 prepayment or may require that we repay the uncredited amount to BASF.

On September 17, 2020, we entered into a contract with a major U.S. automotive original equipment manufacturer (OEM) to supply fabricated, multi-part thermal barriers (Barriers) for use in the battery system of its next-generation electric vehicles (Contract). Pursuant to the Contract, we are obligated to supply Barriers at fixed annual prices and at volumes to be specified by the OEM up to a daily maximum quantity through the term of the agreement, which expires on September 1, 2026. While the OEM has agreed to purchase its requirement for Barriers at locations to be designated from time to time from us, it has no obligation to purchase any minimum quantity of Barriers under the Contract. In addition, the OEM may terminate the Contract any time and for any or no reason. All other terms of the Contract are generally consistent with the OEM's standard purchase terms, including customary quality and warranty provisions.

On February 18, 2020, we completed an underwritten public offering of 1,955,000 shares of our common stock at an offering price of \$8.25 per share. We received net proceeds of \$14.8 million after deducting underwriting discounts and commissions of \$1.1 million and offering expenses of approximately \$0.3 million.

On March 3, 2020, we amended our revolving credit facility with Silicon Valley Bank to extend the maturity date of the facility to April 28, 2021 and establish certain minimum Adjusted EBITDA levels with respect to the minimum Adjusted EBITDA financial covenant for the extended term. On September 25, 2020, we further amended our revolving credit facility with Silicon Valley Bank to revise, among other things, the minimum Adjusted EBITDA financial covenant. Under our revolving credit facility, we are permitted to borrow a maximum of \$20.0 million, subject to continued covenant compliance and borrowing base requirements. At our election, the interest rate applicable to borrowings under the revolving credit facility may be based on the prime rate or LIBOR, subject to a minimum rate of 4.00% per annum. Prime rate-based rates vary from prime rate plus 0.75% per annum to prime rate plus 2.00% per annum, while LIBOR-based rates vary from LIBOR plus 3.75% per annum to LIBOR plus 4.25% per annum. In addition, we are required to pay a monthly unused revolving line of credit facility fee of 0.5% per annum of the average unused portion of the revolving credit facility. We intend to extend or replace the facility prior to its maturity.

On May 1, 2020, our wholly-owned subsidiary, Aspen Aerogels Rhode Island, LLC (Borrower), executed a note for an unsecured loan of \$3,685,800 pursuant to the Paycheck Protection Program (PPP Loan) under the Coronavirus Aid, Relief, and Economic Security Act (CARES Act), as amended, and administered by the U.S. Small Business Administration (SBA). The Borrower conferred with representatives of the SBA prior to finalizing the PPP Loan. The loan is unsecured, contains customary events of default, carries an interest rate of 1% per year, and matures on May 1, 2022. The Borrower may repay the loan at any time without penalty. In addition, the Borrower is permitted at any time to submit an application to extend the maturity of loan to May 1, 2025.

The Borrower may apply to have the PPP Loan indebtedness forgiven in whole or in part subject to SBA guidelines and based on the use of loan proceeds for payroll costs, mortgage interest payments, rent and utility costs over either an eight-week or 24-week period, at the Borrower's option, following its receipt of the loan proceeds. The SBA may disapprove of the Borrower's loan forgiveness application if the agency determines that it was ineligible for the PPP Loan. As of September 30, 2020, the Borrower had not applied for forgiveness.

While the Borrower is not required to apply for PPP Loan forgiveness, upon application forgiveness, it may not receive loan forgiveness in whole or in part. In addition, the amount of potential loan forgiveness will be reduced if the Borrower fails to maintain employee and salary levels during the applicable eight-week or 24-week period following its receipt of the loan proceeds. If the Borrower applies for forgiveness, and the PPP Loan is not forgiven in whole or only forgiven in part, the Borrower will be required to immediately begin making payments of principal and accrued interest in equal monthly installments over the remaining term of the loan for any post-forgiveness balance outstanding. If the Borrower does not apply for forgiveness by August 19, 2021, it will be required to make payments of principal and accrued interest in equal monthly installments over the remaining term of the loan.

The Borrower has used the proceeds of the PPP Loan to support ongoing operations and to sustain staffing levels in our East Providence, Rhode Island manufacturing facility despite the unfavorable impact the COVID-19 pandemic and volatile energy markets are having on its business.

Our revenue for the nine months ended September 30, 2020 was \$77.3 million, which represented a decrease of \$15.6 million, or 17%, from the nine months ended September 30, 2019. Net loss for the nine months ended September 30, 2020 was \$15.6 million and net loss per share was \$0.60. Net loss for the nine months ended September 30, 2019 was \$13.6 million and net loss per share was \$0.57.

With regard to the COVID-19 pandemic, we have implemented and are following safe practices recommended by public health authorities and other government entities. We will continue to focus on the safety and health of our employees, customers and vendors. We have implemented various precautionary measures, including remote work arrangements, restricted business travel and procedures for social distancing, face coverings and safe hygiene. We continue to monitor public health guidance as it evolves and plan to adapt our practices as appropriate. Refer to the section below entitled "Item 1A. Risk Factors" for more information concerning risks to our business associated with COVID-19.

At present, we are not certain of the extent of the impact that the COVID-19 pandemic and global oil market volatility may have on our business. Our manufacturing facility remains operational and we have not encountered any significant disruption to our supply chain or our ability to deliver to our customers. However, the demand for our products has been negatively impacted, particularly due to contractor access restrictions in energy infrastructure facilities, and we expect to experience a year-over-year decrease in total revenue.

In response to this general uncertainty in the market for our products, we have taken a number of actions to reduce expenses, including wage reductions, temporary suspension of board fees and selected reductions to discretionary expenses. In addition, as permitted by the CARES Act, we have elected to defer certain payments of the employer share of Social Security tax that would otherwise be required to be paid during the period beginning on March 27, 2020 and ending December 31, 2020. We are also prepared to temporarily curtail operations in our East Providence, Rhode Island manufacturing facility if necessary to ensure the safety of our employees or to align capacity with the expected lower demand. However, these reductions and any subsequent actions we may take are unlikely to be sufficient to offset the impact of the expected decrease in revenue and we expect to experience a year-over-year increase in net loss and decrease in Adjusted EBITDA in 2020.

Key Metrics and Non-GAAP Financial Measures

We regularly review a number of metrics, including the following key metrics, to evaluate our business, measure our performance, identify trends affecting our business, formulate financial projections and make strategic decisions.

Square Foot Operating Metric

We price our product and measure our product shipments in square feet. We estimate our annual capacity was 55 million square feet of aerogel blankets at September 30, 2020. We believe the square foot operating metric allows us and our investors to measure our manufacturing capacity and product shipments on a uniform and consistent basis. The following chart sets forth product shipments in square feet associated with recognized revenue, including revenue recognized over time utilizing the input method, for the periods presented:

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2020	2019	2020	2019
	(In thousands)			
Product shipments in square feet	6,825	10,360	22,307	27,466

Adjusted EBITDA

We use Adjusted EBITDA, a non-GAAP financial measure, as a means to assess our operating performance. We define Adjusted EBITDA as net income (loss) before interest expense, taxes, depreciation, amortization, stock-based compensation expense and other items, from time to time, which we do not believe are indicative of our core operating performance. Adjusted EBITDA is a supplemental measure of our performance that is not presented in accordance with U.S. GAAP. Adjusted EBITDA should not be considered as an alternative to net income (loss) or any other measure of financial performance calculated and presented in accordance with U.S. GAAP. In addition, our definition and presentation of Adjusted EBITDA may not be comparable to similarly titled measures presented by other companies.

We use Adjusted EBITDA:

- as a measure of operating performance because it does not include the impact of items that we do not consider indicative of our core operating performance;
- for planning purposes, including the preparation of our annual operating budget;
- to allocate resources to enhance the financial performance of our business; and
- as a performance measure used under our bonus plan.

We also believe that the presentation of Adjusted EBITDA provides useful information to investors with respect to our results of operations and in assessing the performance and value of our business. Various measures of EBITDA are widely used by investors to measure a company's operating performance without regard to items that can vary substantially from company to company depending upon financing and accounting methods, book values of assets, capital structures and the methods by which assets were acquired.

Although measures similar to Adjusted EBITDA are frequently used by investors and securities analysts in their evaluation of companies, we understand that Adjusted EBITDA has limitations as an analytical tool, and you should not consider it in isolation or as a substitute for net income (loss), income (loss) from operations, net cash provided by (used in) operating activities or an analysis of our results of operations as reported under U.S. GAAP. Some of these limitations are:

- Adjusted EBITDA does not reflect our historical cash expenditures or future requirements for capital expenditures or other contractual commitments;
- Adjusted EBITDA does not reflect changes in, or cash requirements for, our working capital needs;
- Adjusted EBITDA does not reflect stock-based compensation expense;
- Adjusted EBITDA does not reflect our income tax expense or cash requirements to pay our income taxes;
- Adjusted EBITDA does not reflect our interest expense, or the cash requirements necessary to service interest or principal payments on our debt;
- although depreciation, amortization and impairment charges are non-cash charges, the assets being depreciated, amortized or impaired will often have to be replaced in the future, and Adjusted EBITDA does not reflect any cash requirements for these replacements; and
- other companies in our industry may calculate EBITDA or Adjusted EBITDA differently than we do, limiting their usefulness as a comparative measure.

Because of these limitations, our Adjusted EBITDA should not be considered as a measure of discretionary cash available to us to reinvest in the growth of our business or as a measure of cash available for us to meet our obligations.

To properly and prudently evaluate our business, we encourage you to review the U.S. GAAP financial statements included elsewhere in this Quarterly Report on Form 10-Q, and not to rely on any single financial measure to evaluate our business.

The following table presents a reconciliation of net loss, the most directly comparable U.S. GAAP measure, to Adjusted EBITDA for the periods presented:

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2020	2019	2020	2019
	(In thousands)			
Net loss	\$ (6,753)	\$ (2,289)	\$ (15,620)	\$ (13,609)
Depreciation and amortization	2,545	2,554	7,670	7,651
Stock-based compensation ⁽¹⁾	991	1,011	2,990	2,885
Interest expense	49	136	182	280
Adjusted EBITDA	<u>\$ (3,168)</u>	<u>\$ 1,412</u>	<u>\$ (4,778)</u>	<u>\$ (2,793)</u>

(1) Represents non-cash stock-based compensation related to vesting and modifications of stock option grants, vesting of restricted stock units and vesting of restricted common stock.

Our financial performance, including such measures as net income (loss), earnings per share and Adjusted EBITDA, are affected by a number of factors including volume and mix of aerogel products sold, average selling prices, our material costs and manufacturing expenses, the costs associated with capacity expansions and start-up of additional production capacity, and the amount and timing of operating expenses. Accordingly, we expect that our net income (loss), earnings per share and Adjusted EBITDA will vary from period to period.

Components of Our Results of Operations

Revenue

We recognize product revenue from the sale of our line of aerogel products and research services revenue from the provision of services under contracts with various agencies of the U.S. government and other institutions. Product and research services revenue is recognized upon the satisfaction of contractual performance obligations.

We record deferred revenue for product sales when (i) we have delivered products but other revenue recognition criteria have not been satisfied or (ii) payments have been received in advance of the completion of required performance obligations.

At present, we are not certain of the extent of the impact that the COVID-19 pandemic and global oil market volatility may have on our business. Our manufacturing facility remains operational and we have not yet encountered any significant disruption to our supply chain or our ability to deliver to our customers. However, the demand for our products has been negatively impacted, particularly due to contractor access restrictions in energy infrastructure facilities, and we expect to experience a year-over-year decrease in total revenue.

Cost of Revenue

Cost of product revenue consists primarily of materials and manufacturing expense. Cost of product revenue is recorded when the related product revenue is recognized.

Material is our most significant component of cost of product revenue and includes fibrous batting, silica materials and additives. Material costs as a percentage of product revenue vary from product to product due to differences in average selling prices, material requirements, product thicknesses and manufacturing yields. In addition, we provide warranties for our products and record the estimated cost within cost of revenue in the period that the related revenue is recorded or when we become aware that a potential warranty claim is probable and the cost can be reasonably estimated. As a result of these factors, material costs as a percentage of product revenue will vary from period to period due to changes in the mix of aerogel products sold, the costs of our raw materials or the estimated cost of warranties. We expect that material costs will decrease in absolute dollars during 2020 due to the expected decrease in demand for our products associated with the COVID-19 pandemic and global oil market volatility and lower cost product formulations.

Manufacturing expense is also a significant component of cost of revenue. Manufacturing expense includes labor, utilities, maintenance expense, and depreciation on manufacturing assets. Manufacturing expense also includes stock-based compensation for manufacturing employees and shipping costs. We expect that manufacturing expense will decline in absolute dollars during 2020 principally due to our plan to reduce compensation costs and discretionary expenses in response to the expected decrease in demand for our products associated with the COVID-19 pandemic and global oil market volatility.

In total, we expect that cost of product revenue will decrease in absolute dollars during 2020, but will increase as a percentage of product revenue versus 2019 due to the expected decrease in our 2020 revenue levels associated with the COVID-19 pandemic and global oil market volatility.

Cost of research services revenue consists of direct labor costs of research personnel engaged in contract research, third-party consulting and subcontractor expense, and associated direct material costs. This cost of revenue also includes overhead expenses associated with project resources, development tools and supplies. Cost of research services revenue is recorded when the related research services revenue is recognized. We expect cost of research services will decline as we wind down our existing contract research activities.

Gross Profit

Our gross profit as a percentage of revenue is affected by a number of factors, including the volume of aerogel products produced and sold, the mix of aerogel products sold, average selling prices, our material and manufacturing costs, realized capacity utilization and the costs associated with expansions and start-up of production capacity. Accordingly, we expect our gross profit in absolute dollars and as a percentage of revenue to vary significantly from period to period.

During 2020, the demand for our products has been negatively impacted by the COVID-19 pandemic and global oil market volatility and we expect to experience a year-over-year decrease in total revenue. We also expect that material costs will decrease as a result of the expected decrease in demand for our products and lower cost product formulations. In addition, we expect that manufacturing expenses will decline due to the expected decrease in demand for our products and as a result of our plan to reduce compensation costs and discretionary expenses. However, we expect these material cost and manufacturing reductions will not be sufficient to offset the impact of the expected decrease in revenue and we are likely to experience a year-over-year decrease in gross profit both in absolute dollars and as a percentage of revenue during 2020.

Operating Expenses

Operating expenses consist of research and development, sales and marketing, and general and administrative expenses. Operating expenses include personnel costs, legal fees, professional fees, service fees, insurance premiums, travel expenses, facilities related costs and other costs, expenses and fees. The largest component of our operating expenses is personnel costs, consisting of salaries, benefits, incentive compensation and stock-based compensation. In any particular period, the timing and extent of personnel additions or reductions, legal activities, including patent enforcement actions, marketing programs, research efforts and a range of similar activities or actions could materially affect our operating expenses, both in absolute dollars and as a percentage of revenue.

We expect that operating expenses will decline in absolute dollars during 2020 principally due to our plan to reduce compensation costs and discretionary expenses in response to the general uncertainty associated with the COVID-19 pandemic and global oil market volatility. However, we expect operating expenses will increase as a percentage of revenue versus 2019 due to the expected decrease in demand for our products during 2020.

Research and Development Expenses

Research and development expenses consist primarily of expenses for personnel engaged in the development of next-generation aerogel compositions, form factors and manufacturing technologies. These expenses also include testing services, prototype expenses, consulting services, trial formulations for new products, equipment depreciation, facilities costs and related overhead. We expense research and development costs as incurred. We expect to continue to devote substantial resources to the development of new aerogel technologies. We believe that these investments are necessary to maintain and improve our competitive position. We also expect to continue to invest in research and engineering personnel and the infrastructure required in support of their efforts.

We expect that research and development expenses during 2020 will remain relatively unchanged from 2019 levels. However, we expect research and development expenses to increase a percentage of revenue versus 2019 due to the expected decrease in our revenue during 2020 as a result of the COVID-19 pandemic and global oil market volatility.

Sales and Marketing Expenses

Sales and marketing expenses consist primarily of personnel costs, incentive compensation, marketing programs, travel and related costs, consulting expenses and facilities related costs.

We expect that sales and marketing expenses will decline in absolute dollars during 2020 principally due to our plan to reduce compensation costs and discretionary expenses in response to the general uncertainty associated with the COVID-19 pandemic and global oil market volatility. However, we expect sales and marketing expenses will increase as a percentage of revenue versus 2019 due to the expected decrease in demand for our products during 2020.

General and Administrative Expenses

General and administrative expenses consist primarily of personnel costs, legal expenses, consulting and professional services, audit and tax consulting costs, and expenses for our executive, finance, legal, human resources and information technology organizations. General and administrative expenses include costs related to operating as a publicly-traded company, which include costs of compliance with securities regulations, corporate governance and related laws and regulations, investor relations expenses, insurance premiums, including director and officer insurance, and audit and legal fees. We are currently in technical discussions with the U.S. Environmental Protection Agency (EPA) in connection with the EPA's notice of potential violation and opportunity to confer we received regarding the applicability of certain Resource Conservation and Recovery Act (RCRA) provisions to certain aspects of our manufacturing unit operations. The EPA notice is in connection with the EPA's RCRA Compliance Evaluation Inspection of our East Providence, Rhode Island manufacturing facility in May 2019. While we believe our environmental compliance program is consistent with the RCRA statutory and regulatory framework, the EPA may decide otherwise, find us in violation, assess penalties and compel compliance that may require capital expenditure and resource allocation that may have a material impact on our business. However, at present, the EPA has not made any determination as to any violation and we do not know when the EPA may make any determination. As such, we have determined that while it is possible we will incur expense in this regard, whether any expense will be incurred, its nature, or any amount is not estimable as of September 30, 2020. If the EPA makes such determination or assesses penalties during the fourth quarter of 2020 or in 2021, our expenses in this regard would increase in the respective period. We also expect that the patent enforcement actions, described in more detail under "Legal Proceedings" in Part II, Item 1 of this Quarterly Report on Form 10-Q, if protracted, could result in significant legal expense over the medium to long-term.

We expect that general and administrative expenses will decline in absolute dollars during 2020 principally due to our plan to reduce compensation costs and discretionary expenses in response to the general uncertainty associated with the COVID-19 pandemic and global oil market volatility. However, we expect general and administrative expenses will increase as a percentage of revenue versus 2019 due to the expected decrease in demand for our products during 2020.

Interest Expense, Net

Interest expense, net consists primarily of fees and interest expense related to our revolving credit facility.

Provision for Income Taxes

We have incurred net losses since inception and have not recorded benefit provisions for U.S. federal income taxes or state income taxes since the tax benefits of our net losses have been offset by valuation allowances due to the uncertainty associated with the utilization of net operating loss carryforwards.

Results of Operations

Three months ended September 30, 2020 compared to the three months ended September 30, 2019

The following tables set forth a comparison of the components of our results of operations for the periods presented:

Revenue

	Three Months Ended September 30,				Change	
	2020		2019			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
(\$ in thousands)						
Revenue:						
Product	\$ 23,939	99%	\$ 35,046	99%	\$ (11,107)	(32)%
Research services	256	1%	379	1%	(123)	(32)%
Total revenue	\$ 24,195	100%	\$ 35,425	100%	\$ (11,230)	(32)%

The following chart sets forth product shipments in square feet associated with recognized revenue, including revenue recognized over time utilizing the input method, for the periods presented:

	Three Months Ended September 30,		Change	
	2020	2019	Amount	Percentage
Product shipments in square feet (in thousands)	6,825	10,360	(3,535)	(34)%

Total revenue decreased \$11.2 million, or 32%, to \$24.2 million for the three months ended September 30, 2020 from \$35.4 million in the comparable period in 2019. The decrease in total revenue was the result of decreases in both product revenue and research services revenue.

Product revenue decreased by \$11.1 million, or 32%, to \$23.9 million for the three months ended September 30, 2020 from \$35.0 million in the comparable period in 2019. This decrease was principally the result of COVID-19 related decreases in both project and maintenance-based demand in the global energy infrastructure market, particularly in North America, offset, in part, by increases in project-based demand in the subsea market, growth in the building materials market and the impact of price increases enacted in 2020.

Product revenue for the three months ended September 30, 2020 included \$5.2 million to an Asian LNG project contractor, \$4.2 million to a North American distributor and \$3.0 million to a subsea contractor. Product revenue for the three months ended September 30, 2019 included \$7.9 million and \$4.8 million to two North American distributors, respectively, and \$6.8 million to an Asian LNG project contractor.

The average selling price per square foot of our products increased by \$0.13, or 4%, to \$3.51 per square foot for the three months ended September 30, 2020 from \$3.38 per square foot for the three months ended September 30, 2019. The increase in average selling price principally reflected the impact of price increases enacted in 2020 and a shift in mix toward higher priced products. This increase in average selling price had the effect of increasing product revenue by \$0.9 million for the three months ended September 30, 2020 from the comparable period in 2019.

In volume terms, product shipments decreased by 3.6 million square feet, or 34%, to 6.8 million square feet of aerogel products for the three months ended September 30, 2020, as compared to 10.4 million square feet for the three months ended September 30, 2019. The decrease in product volume had the effect of decreasing product revenue by \$12.0 million for the three months ended September 30, 2020 from the comparable period in 2019.

Research services revenue decreased \$0.1 million, or 32%, to \$0.3 million for the three months ended September 30, 2020 from \$0.4 million in the comparable period in 2019. The decrease was primarily due to our decision to wind down our contract research activities to focus our research and development resources on improving our existing business profitability and developing new products and next-generation technology with application in new, high value markets.

Product revenue was 99% of total revenue for the both three months ended September 30, 2020 and 2019. Research services revenue was 1% of total revenue for the both the three months ended September 30, 2020 and 2019.

Cost of Revenue

	Three Months Ended September 30,						Change	
	2020			2019				
	Amount	Percentage of Related Revenue	Percentage of Total Revenue	Amount	Percentage of Related Revenue	Percentage of Total Revenue	Amount	Percentage
(\$ in thousands)								
Cost of revenue:								
Product	\$ 22,243	93%	92%	\$ 27,510	78%	78%	\$ (5,267)	(19)%
Research services	52	20%	0%	173	46%	0%	(121)	(70)%
Total cost of revenue	\$ 22,295	92%	92%	\$ 27,683	78%	78%	\$ (5,388)	(19)%

Total cost of revenue decreased \$5.4 million, or 19%, to \$22.3 million for the three months ended September 30, 2020 from \$27.7 million in the comparable period in 2019. The decrease in total cost of revenue was the result of decreases in both product cost of revenue and research services cost of revenue.

Product cost of revenue decreased \$5.3 million, or 19%, to \$22.2 million for the three months ended September 30, 2020 from \$27.5 million in the comparable period in 2019. The \$5.3 million decrease was the result of a \$4.4 million decrease in material costs and a \$0.9 million decrease in manufacturing expense. The decrease in material costs was the result of the 3.6 million square feet, or 34%, decrease in total product shipments and lower cost product formulations. The decrease in manufacturing expense was the result of decreases in variable plant and operating costs of \$0.9 million associated with the 34% decrease in total product shipments and in compensation and related costs of \$0.3 million, offset, in part, by an increase in maintenance expense of \$0.3 million.

Product cost of revenue as a percentage of product revenue increased to 93% during the three months ended September 30, 2020 from 78% during the three months ended September 30, 2019. This increase was the result of the high proportion of fixed manufacturing expenses that remained essentially unchanged despite a 32% decrease in product revenue for the three months ended September 30, 2020 from the comparable period in 2019, offset, in part, by the impact of price increases enacted in 2020, lower cost product formulations, and our initiatives to reduce manufacturing expense.

Research services cost of revenue decreased \$0.1 million, or 70%, to less than \$0.1 million for the three months ended September 30, 2020 from \$0.2 million for the comparable period in 2019. Cost of research service revenue as a percentage of research services revenue decreased to 20% during the three months ended September 30, 2020 from 46% in the comparable period in 2019 due to a decrease in the proportion of third-party services utilized to support the contracted research.

Gross Profit

	Three Months Ended September 30,				Change	
	2020		2019			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
	(\$ in thousands)					
Gross profit	\$ 1,900	8%	\$ 7,742	22%	\$ (5,842)	(75)%

Gross profit decreased \$5.8 million, or 75%, to \$1.9 million for the three months ended September 30, 2020 from \$7.7 million in the comparable period in 2019. The decrease in gross profit was the result of the \$11.2 million decrease in total revenue offset by the \$5.4 million decrease in total cost of revenue. The decrease in revenue was principally the result of COVID-19 related decreases in both project and maintenance-based demand in the global onshore energy infrastructure market, particularly in North America, offset, in part, by increases in project-based demand in the subsea market, growth in the building materials market and the impact of price increases enacted in 2020. The decrease in total cost of revenue was the result of the 3.6 million square feet, or 34%, decrease in total product shipments, lower cost product formulations and a decrease in manufacturing expense.

Gross profit as a percentage of total revenue decreased to 8% of total revenue for the three months ended September 30, 2020 from 22% in the comparable period in 2019.

Research and Development Expenses

	Three Months Ended September 30,				Change	
	2020		2019			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
	(\$ in thousands)					
Research and development expenses	\$ 2,088	9%	\$ 2,046	6%	\$ 42	2%

Research and development expenses increased less than \$0.1 million, or 2%, to \$2.1 million for the three months ended September 30, 2020 from \$2.0 million in the comparable period in 2019. The \$0.1 million increase reflects our decision to divert research resources from contract research activities toward the development of new products and next-generation technology with application in new, high value markets.

Research and development expenses as a percentage of total revenue increased to 9% for the three months ended September 30, 2020 from 6% in the comparable period in 2019 principally due to the decrease in revenue during the three months ended September 30, 2020.

Sales and Marketing Expenses

	Three Months Ended September 30,				Change	
	2020		2019			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
	(\$ in thousands)					
Sales and marketing expenses	\$ 2,755	11%	\$ 3,992	11%	\$ (1,237)	(31)%

Sales and marketing expenses decreased \$1.2 million, or 31%, to \$2.8 million for the three months ended September 30, 2020 from \$4.0 million in the comparable period in 2019. The \$1.2 million decrease was the result of decreases in compensation and related costs of \$0.5 million, travel expense of \$0.4 million, sales consultant expense of \$0.2 million and other marketing expenses of \$0.1 million.

Sales and marketing expenses as a percentage of total revenue remained 11% of total revenue for the three months ended September 30, 2020 and 2019.

General and Administrative Expenses

	Three Months Ended September 30,				Change	
	2020		2019			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
	(\$ in thousands)					
General and administrative expenses	\$ 3,761	16%	\$ 3,857	11%	\$ (96)	(2)%

General and administrative expenses decreased \$0.1 million, or 2%, to \$3.8 million for the three months ended September 30, 2020 from \$3.9 million in the comparable period in 2019. The \$0.1 million decrease was the result of decreases in compensation and related costs of \$0.1 million, legal expense of \$0.1 million and other general and administrative expenses of \$0.1 million, offset, in part, by an increase in provisions for uncollectible accounts receivable of \$0.2 million.

General and administrative expenses as a percentage of total revenue increased to 16% for the three months ended September 30, 2020 from 11% in the comparable period in 2019 principally due to the 32% decrease in total revenue.

Interest Expense, net

	Three Months Ended September 30,				Change	
	2020		2019			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
	(\$ in thousands)					
Interest expense, net	\$ (49)	(0)%	\$ (136)	(0)%	\$ 87	(64)%

Interest expense, net, consists primarily of fees and interest expense associated with outstanding balances under our revolving credit agreement. Interest expense, net, decreased to less than \$0.1 million during the three months ended September 30, 2020 from slightly more than \$0.1 million during the three months ended September 30, 2019.

Nine months ended September 30, 2020 compared to the nine months ended September 30, 2019

The following tables set forth a comparison of the components of our results of operations for the periods presented:

Revenue

	Nine Months Ended September 30,				Change	
	2020		2019			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
(\$ in thousands)						
Revenue:						
Product	\$ 76,772	99%	\$ 90,739	98%	\$ (13,967)	(15)%
Research services	483	1%	2,131	2%	(1,648)	(77)%
Total revenue	\$ 77,255	100%	\$ 92,870	100%	\$ (15,615)	(17)%

The following chart sets forth product shipments in square feet for the periods presented:

	Nine Months Ended September 30,		Change	
	2020	2019	Amount	Percentage
Product shipments in square feet (in thousands)	22,307	27,466	(5,159)	(19)%

Total revenue decreased \$15.6 million, or 17%, to \$77.3 million for the nine months ended September 30, 2020 from \$92.9 million in the comparable period in 2019. The decrease in total revenue was the result of decreases in both product revenue and research services revenue.

Product revenue decreased approximately \$14.0 million, or 15%, to \$76.8 million for the nine months ended September 30, 2020 from \$90.7 million in the comparable period in 2019. This decrease was principally the result of COVID-19 related decreases in both project and maintenance-based demand in the global onshore energy infrastructure markets and project-based revenue in the subsea market, offset, in part, by an increase in project-based demand in the Asian LNG market, growth in the building materials market and the impact of price increases enacted in 2019 and 2020.

Product revenue for the nine months ended September 30, 2020 included \$15.3 million to an Asian LNG project contractor and \$13.6 million to a North American distributor. Product revenue for the nine months ended September 30, 2019 included \$17.9 million to a North American distributor and \$10.5 million to an Asian LNG project contractor.

The average selling price per square foot of our products increased by \$0.14, or 4%, to \$3.44 per square foot for the nine months ended September 30, 2020 from \$3.30 per square foot for the nine months ended September 30, 2019. The increase in average selling price principally reflected the impact of price increases enacted in 2019 and 2020. This increase in average selling price had the effect of increasing product revenue by \$3.0 million for the nine months ended September 30, 2020 from the comparable period in 2019.

In volume terms, product shipments decreased by 5.2 million square feet, or 19%, to 22.3 million square feet of aerogel products for the nine months ended September 30, 2020, as compared to 27.5 million square feet for the nine months ended September 30, 2019. The decrease in product volume had the effect of decreasing product revenue by \$17.0 million for the nine months ended September 30, 2020 from the comparable period in 2019.

Research services revenue decreased \$1.6 million, or 77%, to \$0.5 million for the nine months ended September 30, 2020 from \$2.1 million in the comparable period in 2019. The decrease was primarily due to our decision to wind down our contract research activities to focus our research and development resources on improving our existing business profitability and developing new products and next-generation technology with application in new, high value markets.

Product revenue was 99% of total revenue for the nine months ended September 30, 2020 and 98% of total revenue for the nine months ended September 30, 2019. Research services revenue was 1% of total revenue for the nine months ended September 30, 2020 and 2% of total revenue for the nine months ended September 30, 2019.

Cost of Revenue

	Nine Months Ended September 30,						Change	
	2020			2019				
	Amount	Percentage of Related Revenue	Percentage of Total Revenue	Amount	Percentage of Related Revenue	Percentage of Total Revenue	Amount	Percentage
(\$ in thousands)								
Cost of revenue:								
Product	\$ 66,403	86%	86%	\$ 76,703	85%	83%	\$ (10,300)	(13)%
Research services	121	25%	0%	1,193	56%	1%	(1,072)	(90)%
Total cost of revenue	\$ 66,524	86%	86%	\$ 77,896	84%	84%	\$ (11,372)	(15)%

Total cost of revenue decreased \$11.4 million, or 15%, to \$66.5 million for the nine months ended September 30, 2020 from \$77.9 million in the comparable period in 2019. The decrease in total cost of revenue was the result of decreases in both product cost of revenue and research services cost of revenue.

Product cost of revenue decreased \$10.3 million, or 13%, to \$66.4 million for the nine months ended September 30, 2020 from \$76.7 million in the comparable period in 2019. The \$10.3 million decrease was the result of an \$8.1 million decrease in material costs and a \$2.2 million decrease in manufacturing expense. The decrease in material costs was driven principally by the 5.2 million square feet, or 19%, decrease in product shipments and lower cost product formulations. The decrease in manufacturing expense was the result of decreases in variable plant and operating costs of \$1.9 million associated with the 19% decrease in total product shipments and in compensation and related costs of \$0.4 million, offset, in part, by an increase in maintenance expense of \$0.1 million.

Product cost of revenue as a percentage of product revenue increased to 86% during the nine months ended September 30, 2020 from 85% during the nine months ended September 30, 2019. This increase was the result of the high proportion of fixed manufacturing expenses that remained essentially unchanged despite a 15% decrease in product revenue for the nine months ended September 30, 2020 from the comparable period in 2019, offset, in part, by the impact of price increases enacted in 2019 and 2020, lower cost product formulations, and our initiatives to reduce manufacturing expense.

Research services cost of revenue decreased \$1.1 million, or 90%, to \$0.1 million for the nine months ended September 30, 2020 from \$1.2 million for the comparable period in 2019. Cost of research service revenue as a percentage of research services revenue decreased to 25% during the nine months ended September 30, 2020 from 56% in the comparable period in 2019 due to a decrease in the proportion of outside services utilized to support the contracted research.

Gross Profit

	Nine Months Ended September 30,					
	2020		2019		Change	
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
	(\$ in thousands)					
Gross profit	\$ 10,731	14%	\$ 14,974	16%	\$ (4,243)	(28)%

Gross profit decreased \$4.2 million, or 28%, to \$10.7 million for the nine months ended September 30, 2020 from \$15.0 million in the comparable period in 2019. The decrease in gross profit was the result of the \$15.6 million decrease in total revenue, offset by the \$11.4 million decrease in total cost of revenue. The decrease in revenue was principally the result of COVID-19 related decreases in both project and maintenance-based demand in the global onshore energy infrastructure markets and project-based revenue in the subsea market, offset, in part, by an increase in project-based demand in the Asian LNG market, growth in the building materials market and the impact of price increases enacted in 2019 and 2020. The decrease in total cost of revenue was driven principally by the 5.2 million square foot, or 19%, decrease in product shipments, lower cost product formulations, and a decrease in manufacturing expense.

Gross profit as a percentage of total revenue decreased to 14% of total revenue for the nine months ended September 30, 2020 from 16% in the comparable period in 2019.

Research and Development Expenses

	Nine Months Ended September 30,								
	2020			2019			Change		
	Percentage		Amount	Percentage		Amount	Percentage		
	Amount	of Revenue		Amount	of Revenue				
	(\$ in thousands)								
Research and development expenses	\$	6,436	8%	\$	5,842	6%	\$	594	10%

Research and development expenses increased \$0.6 million, or 10%, to \$6.4 million for the nine months ended September 30, 2020 from \$5.8 million in the comparable period in 2019. The \$0.6 million increase reflects our decision to increase efforts to develop new products and next-generation technology with application in new, high value markets and was primarily the result increases in compensation and related costs of \$0.5 million and other research and development expenses of \$0.1 million.

Research and development expenses as a percentage of total revenue increased to 8% of for the nine months ended September 30, 2020 from 7% in the comparable period in 2019 due to both the increase in research and development expenses and the decrease in total revenue.

Sales and Marketing Expenses

	Nine Months Ended September 30,				Change	
	2020		2019			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
	(\$ in thousands)					
Sales and marketing expenses	\$ 9,051	12%	\$ 11,012	12%	\$ (1,961)	(18)%

Sales and marketing expenses decreased approximately \$1.9 million, or 18%, to \$9.1 million for the nine months ended September 30, 2020 from \$11.0 million in the comparable period in 2019. The \$1.9 million decrease was the result of decreases in travel expenses of \$1.0 million, compensation and related costs of \$0.7 million and other marketing expenses of \$0.4 million, offset, in part, by an increase in sales consultant expenses of \$0.2 million.

Sales and marketing expenses as a percentage of total revenue remained 12% for the nine months ended September 30, 2020 and 2019.

General and Administrative Expenses

	Nine Months Ended September 30,					
	2020		2019		Change	
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
	(\$ in thousands)					
General and administrative expenses	\$ 10,682	14%	\$ 11,449	12%	\$ (767)	(7)%

General and administrative expenses decreased approximately \$0.7 million, or 7%, to \$10.7 million during the nine months ended September 30, 2020 from \$11.4 million in the comparable period in 2019. The \$0.7 million decrease was the result of decreases in patent enforcement costs of \$0.4 million, compensation and related costs of \$0.4 million, and other general and administrative expenses of \$0.3 million, offset, in part, by a decrease in recoveries of prior provisions for uncollectible accounts receivable of \$0.2 million and an increase provisions for uncollectible accounts of \$0.2 million.

General and administrative expenses as a percentage of total revenue increased to 14% of total revenue for the nine months ended September 30, 2020 from 12% in the comparable period in 2019 principally due to the 17% decrease in total revenue.

Interest Expense, net

	Nine Months Ended September 30,				Change	
	2020		2019			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
	(\$ in thousands)					
Interest expense, net	\$ (182)	(0)%	\$ (280)	(0)%	\$ 98	(35)%

Interest expense, net, consists primarily of fees and interest expense associated with outstanding balances under our revolving credit agreement. Interest expense, net, was \$0.2 million and \$0.3 million during the nine months ended September 30, 2020 and 2019, respectively.

Liquidity and Capital Resources

Overview

We have experienced significant losses and invested substantial resources since our inception to develop, commercialize and protect our aerogel technology and to build a manufacturing infrastructure capable of supplying aerogel products at the volumes and costs required by our customers. These investments have included research and development and other operating expenses, capital expenditures and investment in working capital balances.

Through 2015, we experienced revenue growth and gained share in our target markets. Despite a decline in revenue in 2016, 2017 and 2018, we experienced strong growth in revenue, gross profit and cash flows from operations during 2019. Our financial projections anticipate long-term revenue growth, increasing levels of gross profit and improved cash flow from operations. To support this growth, we initiated a plan in 2018 to increase the capacity of our East Providence, Rhode Island manufacturing facility to approximately 60 million square feet of aerogel blankets by the end of 2020. We have delayed the implementation of our next-generation chemistry and process technologies during 2020 and currently expect to achieve our EP20 goals by the end of 2021. We may incur additional capital expenditures to complete this plan during the remainder of 2020 and in 2021. In addition, we are increasing our investment in the research and development of next-generation aerogel products and technologies. During 2020, we are developing aerogel products and technologies for the electric vehicle market. We believe the commercial potential for our technology in the electric vehicle market is significant and could require us to hire additional personnel, incur additional operating expenses, incur capital expenditures to expand aerogel manufacturing capacity, build an automated fabrication operation, and meet automotive quality system requirements, among other items.

We have taken several actions to date in 2020 to increase the financial resources available to support current operating requirements, capacity expansions and strategic investments. In February 2020, we completed an underwritten public offering of our common stock and received net proceeds of \$14.8 million. In March 2020, we extended the maturity of our revolving credit facility with Silicon Valley Bank to April 28, 2021. Additionally, in May 2020, our wholly-owned subsidiary, Aspen Aerogels Rhode Island, LLC, received PPP Loan proceeds of \$3.7 million under the CARES Act.

We believe that our existing cash balance will be sufficient to support current operating requirements and research and development activities. However, we are not certain of the extent and duration of the impact that the COVID-19 pandemic and global oil market volatility will have on our business. The demand for our products has been negatively impacted and we are experiencing a significant year-over-year decrease in total revenue during 2020.

In response to the decrease in demand for our products, we instituted a number of actions to reduce expenses and to improve liquidity during the nine months ended September 30, 2020. However, these actions and any subsequent actions we may take are unlikely to be sufficient to offset the impact of the decrease in revenue and we will experience a year-over-year increase in net loss, a decrease in Adjusted EBITDA and an increase in cash used in operating activities during 2020. In addition, we are likely to incur an increase in operating expenses and capital expenditures during 2021 in support of our evolving commercial opportunities in the electric vehicle markets and other strategic business initiatives.

As a result, we plan to supplement our cash balance with additional credit facilities, debt financings, customer prepayments, technology licensing fees or equity financings to provide the capital necessary to fund operating requirements, to complete future capacity expansions or to support evolving strategic business initiatives. We also intend to extend or replace our revolving credit facility with Silicon Valley Bank prior to its maturity.

Primary Sources of Liquidity

Our principal sources of liquidity are currently our cash and cash equivalents and our revolving credit facility with Silicon Valley Bank. Cash and cash equivalents consist primarily of cash and money market accounts on deposit with banks. As of September 30, 2020, we had \$11.3 million of cash and cash equivalents.

On February 18, 2020, we completed an underwritten public offering of 1,955,000 shares of our common stock at an offering price of \$8.25 per share. We received net proceeds of \$14.8 million after deducting underwriting discounts and commissions of \$1.1 million and offering expenses of approximately \$0.3 million.

On May 1, 2020, our wholly-owned subsidiary, Aspen Aerogels Rhode Island, LLC (Borrower) executed a note for an unsecured loan of \$3,685,800 pursuant to the PPP under the CARES Act, as amended, and administered by the SBA. The loan is unsecured, contains customary events of default, carries an interest rate of 1% per year, and matures on May 1, 2022. The Borrower may repay the loan in full at any time without penalty. In addition, the Borrower is permitted at any time to submit an application to extend the maturity of loan to May 1, 2025.

The Borrower may apply to have the PPP Loan indebtedness forgiven in whole or in part subject to SBA guidelines and based on the use of loan proceeds for payroll costs, mortgage interest payments, rent and utility costs over either an eight-week or 24-week period, at the Borrower's option, following its receipt of the loan proceeds. The SBA may disapprove of the Borrower's loan forgiveness application if the agency determines that it was ineligible for the PPP Loan. As of September 30, 2020, the Borrower had not applied for forgiveness.

While the Borrower is not required to apply for PPP Loan forgiveness, upon application for forgiveness, it may not receive loan forgiveness in whole or in part. In addition, the amount of potential loan forgiveness will be reduced if the Borrower fails to maintain employee and certain salary levels during the applicable eight-week or 24-week period following its receipt of the loan proceeds. If the Borrower applies for forgiveness, and the PPP Loan is not forgiven in whole or only forgiven in part, it will be required to immediately begin making payments of principal and accrued interest in equal monthly installments over the remaining term of the loan for any post-forgiveness balance outstanding. If the Borrower does not apply for forgiveness by August 19, 2021, it will be required to make payments of principal and accrued interest in equal monthly installments over the remaining term of the loan.

The Borrower has used the proceeds of the PPP Loan to support ongoing operations and to sustain staffing levels in our East Providence, Rhode Island manufacturing facility despite the unfavorable impact the COVID-19 pandemic and volatile energy markets are having on our business.

At September 30, 2020, we had no outstanding borrowings under our revolving credit facility with Silicon Valley Bank, \$1.4 million of outstanding letters of credit secured by the revolving credit facility, \$3.7 million outstanding on the PPP Loan, and an obligation of \$9.8 million associated with prepayments received pursuant to our supply agreement with BASF.

We have maintained the revolving credit facility, as amended from time to time, with Silicon Valley Bank since March 2011. On March 3, 2020, our revolving credit facility was amended to extend the maturity date of the facility to April 28, 2021 and to establish certain minimum Adjusted EBITDA levels with respect to the minimum Adjusted EBITDA financial covenant for the extended term. On September 25, 2020, we further amended our revolving credit facility with Silicon Valley Bank to revise, among other things, the minimum Adjusted EBITDA financial covenant. We intend to extend or replace the facility prior to its maturity.

Under our revolving credit facility, we are permitted to borrow a maximum of \$20.0 million, subject to continued covenant compliance and borrowing base requirements. At our election, the interest rate applicable to borrowings under the revolving credit facility may be based on the prime rate or LIBOR, subject to a minimum rate of 4.00% per annum. Prime rate-based rates vary from prime rate plus 0.75% per annum to prime rate plus 2.00% per annum, while LIBOR-based rates vary from LIBOR plus 3.75% per annum to LIBOR plus 4.25% per annum. In addition, we are required to pay a monthly unused revolving line of credit facility fee of 0.5% per annum of the average unused portion of the revolving credit facility.

Under the revolving credit facility, we are required to comply with both non-financial and financial covenants, including the minimum Adjusted EBITDA covenant, as defined in the loan agreement. At September 30, 2020, we were in compliance with all such covenants.

The amount available to us under the facility at September 30, 2020 was \$8.1 million after giving effect to the \$1.4 million of letters of credit outstanding.

Analysis of Cash Flow

Net Cash Used in Operating Activities

During the nine months ended September 30, 2020, we used \$4.8 million in net cash in operating activities, as compared to the use of \$5.8 million in net cash during the comparable period in 2019, a decrease in the use of cash of \$1.0 million. This decrease in use of cash was the result of a decrease in net cash used by changes in operating assets and liabilities of \$2.7 million, offset, in part, by an increase in net loss adjusted for non-cash items of \$1.7 million.

Net Cash Used in Investing Activities

Net cash used in investing activities is primarily related to capital expenditures to support our growth. Net cash used in investing activities for the nine months ended September 30, 2020 and 2019 was \$2.6 million and \$1.6 million, respectively, in capital expenditures primarily for machinery and equipment to improve the capacity, throughput, efficiency and reliability of our East Providence facility.

Net Cash Provided by Financing Activities

Net cash provided by financing activities for the nine months ended September 30, 2020 totaled \$15.1 million and consisted of \$19.4 million in borrowings under our line of credit, \$14.8 million in net proceeds from an underwritten public offering of our common stock, \$3.7 million in net proceeds from the issuance of long-term debt, and \$1.0 million in proceeds from employee stock option exercises, offset, in part, by \$22.6 million of repayments under our line of credit and \$1.2 million in cash used for payments made for employee tax withholdings associated with the vesting of restricted stock units.

Net cash provided by financing activities for the nine months ended September 30, 2019 totaled \$5.2 million and consisted of \$90.0 million in borrowings under our line of credit and \$5.0 million in prepayment proceeds under our supply agreement with BASF, offset, in part, by \$89.3 million of repayments under our line of credit and \$0.5 million in cash used for payments made for employee tax withholdings associated with the vesting of restricted stock units.

Off Balance Sheet Arrangements

Since inception, we have not engaged in any off balance sheet activities as defined in Item 303(a)(4) of Regulation S-K.

Contractual Obligations and Commitments

There have been no material changes to our contractual obligations and commitments as reported in our Annual Report.

Recent Accounting Pronouncements

Information regarding new accounting pronouncements is included in note 2 to our unaudited consolidated financial statements contained in Item 1 of this Quarterly Report on Form 10-Q.

Critical Accounting Policies and Estimates

Our financial statements are prepared in accordance with U.S. GAAP. The preparation of our financial statements and related disclosures requires us to make estimates, assumptions and judgments that affect the reported amount of assets, liabilities, revenue, costs and expenses and related disclosures. We believe that the estimates, assumptions and judgments involved in these accounting policies have the greatest potential impact on our financial statements and, therefore, we consider these to be our critical accounting policies. Accordingly, we evaluate our estimates and assumptions on an ongoing basis. Our actual results may differ from these estimates under different assumptions and conditions. See our Annual Report and note 2 to our consolidated financial statements included elsewhere in this Quarterly Report on Form 10-Q for information about these critical accounting policies, as well as a description of our other significant accounting policies.

Certain Factors That May Affect Future Results of Operations

The SEC encourages companies to disclose forward-looking information so that investors can better understand a company's future prospects and make informed investment decisions. This Quarterly Report on Form 10-Q contains such "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995. These statements involve known and unknown risks, uncertainties and other important factors which may cause our actual results, performance or achievements to be materially different from any future results, performances or achievements expressed or implied by the forward-looking statements. Forward-looking statements include, but are not limited to, statements about: our beliefs in the appropriateness of our assumptions, the accuracy of our estimates regarding expenses, loss contingencies, future revenues, future profits, uses of cash, available credit, PPP Loan Proceeds, capital requirements, and the need for additional financing to operate our business, including to complete the planned capacity expansion of our East Providence manufacturing facility, and to fund our planned strategic business initiatives; the performance of our aerogel blankets; our expectation that we will be successful in obtaining, enforcing and defending our patents against competitors and that such patents are valid and enforceable; our belief that our products possess strong competitive advantages over traditional insulation materials, including the superior thermal performance and the thin, easy-to-use and durable blanket form of our products; our plans to expand capacity in our East Providence, Rhode Island manufacturing facility; our estimates of annual production capacity; our expectation to achieve our EP20 goals by the end of 2021; beliefs about the role of our technology and

products in the electric vehicle market; beliefs about the commercial potential for our technology in the electric vehicle market; beliefs about our ability to produce and deliver products to electric vehicle customers; beliefs about Aspen's contract with the major U.S. automotive manufacturer; beliefs about the potential for the major U.S. automotive manufacturer to become a significant customer for Aspen's products; beliefs about revenue, costs, expenses, profitability, investments or cash flow associated with the contract with the major U.S. automotive manufacturer; beliefs about the performance of our thermal barrier products in the battery systems of electric vehicles; beliefs about the potential the commercial opportunity for Aspen's thermal barrier products; our strategic partnership with BASF and the potential benefits of such a relationship, including the potential for it to create new product and market opportunities; our supply agreement with BASF, our supply to BASF of its Spaceloft A2 product and newly developed product, the potential for future cash advances from BASF under our supply agreement with BASF (payment of which are subject to certain conditions) to provide a source of financing and the potential for BASF to become a significant customer for our products; our joint development agreement with BASF, and the potential for it to support the development of new aerogel products and technologies; our beliefs about the usefulness of the square foot operating metric; our beliefs about the financial metrics that are indicative of our core performance; our beliefs about the usefulness of our presentation of Adjusted EBITDA; our expectations about the effect of manufacturing capacity on financial metrics such as Adjusted EBITDA; our expectations about future revenues, expenses, gross profit, net loss, loss per share and Adjusted EBITDA, sources and uses of cash, capital requirements and the sufficiency of our existing cash balance and available credit; our beliefs about the outcome, effects or estimated costs of current or potential litigation or their respective timing, including expected legal expense in connection with our patent enforcement actions; our plans to devote substantial resources to the development of new aerogel technology; our expectations about product mix; our expectations about future material costs and manufacturing expenses as a percentage of revenue; our expectations of future gross profit and the effect of manufacturing expenses, manufacturing capacity and productivity on gross profit; our expectations about our resources and other investments in new technology and related research and development activities and associated expenses; our expectations about short and long term (a) research and development (b) general and administrative and (c) sales and marketing expenses; our expectations of revenue growth, increased gross profit, and improving cash flows over the long term; our intentions about managing capital expenditures and working capital balances; our expectations about incurring significant capital expenditures in the future; our expectations about the expansion of our workforce and resources and its effect on sales and marketing, general and administrative, and related expenses; our expectations about future product revenue and demand for our products; our expectations about the effect of stock based compensation on various costs and expenses; our expectations about potential sources of future financing; our beliefs about the impact of accounting policies on our financial statements; our beliefs about the effect of interest rates, inflation and foreign currency fluctuations on our results of operations and financial condition; our beliefs about the expansion of our international operations; our statements about the impact of major public health concerns, including the COVID-19 pandemic or other pandemics arising globally, and the future, and currently unknown extent of, the impact of the COVID-19 pandemic on our business and operations; our statements about the sufficiency of our current and future actions to address the impact of the COVID-19 pandemic on our business and operations, including our future revenue, Adjusted EBITDA and other financial metrics; our belief that we qualify for partial or complete forgiveness of the PPP Loan; and changes by governmental authorities regarding the CARES Act or related administrative matters and the Company's and its subsidiary's abilities to comply with the terms of the PPP Loan and the CARES Act, including to use the proceeds of the PPP Loan as described herein.

Words such as "may," "will," "anticipate," "estimate," "expects," "projects," "intends," "plans," "believes" and words and terms of similar substance used in connection with any discussion of future operating or financial performance, identify forward-looking statements. All forward-looking statements are management's present expectations of future events and are subject to a number of risks and uncertainties that could cause actual results to differ materially and adversely from those described in the forward-looking statements. These risks include, but are not limited to, those set forth in this Quarterly Report on Form 10-Q and under the heading "Risk Factors" contained in Item 1A of our Annual Report.

In light of these assumptions, risks and uncertainties, the results and events discussed in the forward-looking statements contained in this Quarterly Report on Form 10-Q might not occur. Stockholders and other readers are cautioned not to place undue reliance on the forward-looking statements, which speak only as of the date of this Quarterly Report on Form 10-Q. We are not under any obligation, and we expressly disclaim any obligation, to update or alter any forward-looking statements, whether as a result of new information, future events or otherwise. All subsequent forward-looking statements attributable to Aspen Aerogels, Inc. or to any person acting on its behalf are expressly qualified in their entirety by the cautionary statements contained or referred to in this section.

Item 3. Quantitative and Qualitative Disclosures About Market Risk.

Market risk represents the risk of loss that may impact our financial position due to adverse changes in financial market prices and rates. Our market risk exposure results primarily from fluctuations in interest rates as well as from inflation. In the normal course of business, we are exposed to market risks, including changes in interest rates which affect our line of credit under our revolving credit facility as well as cash flows. We may also face additional exchange rate risk in the future as we expand our business internationally.

Interest Rate Risk

We are exposed to changes in interest rates in the normal course of our business. At September 30, 2020, we had unrestricted cash and cash equivalents of \$11.3 million. These amounts were held for working capital and capital expansion purposes and were invested primarily in deposit and money market accounts at a major financial institution in North America. Due to the short-term nature of these investments, we believe that our exposure to changes in the fair value of our cash as a result of changes in interest rates is not material.

As of September 30, 2020, we had no borrowings outstanding on our revolving credit facility. At September 30, 2020, we had \$1.4 million of outstanding letters of credit supported by the revolving credit facility.

Under our revolving credit facility, we are permitted to borrow a maximum of \$20.0 million, subject to continued covenant compliance and borrowing base requirements. At our election, the interest rate applicable to borrowings under the revolving credit facility may be based on the prime rate or LIBOR, subject to a minimum rate of 4.00% per annum. Prime rate-based rates vary from prime rate plus 0.75% per annum to prime rate plus 2.00% per annum, while LIBOR-based rates vary from LIBOR plus 3.75% per annum to LIBOR plus 4.25% per annum. In addition, we are required to pay a monthly unused revolving line of credit facility fee of 0.5% per annum of the average unused portion of the revolving credit facility. The maturity date of our revolving credit facility is April 28, 2021.

At September 30, 2020, the amount available to us under the revolving credit facility was \$8.1 million after giving effect to the \$1.4 million of letters of credit outstanding under the facility.

The PPP Loan executed on May 1, 2020 has an interest rate of 1% per annum. As of September 30, 2020, the PPP Loan matures in two years from the date of the note. We are permitted to submit an application to amend the loan to provide for a five-year term in accordance with the Flexibility Act. The PPP Loan has an outstanding balance of \$3.7 million as of September 30, 2020.

Inflation Risk

Although we expect that our operating results will be influenced by general economic conditions, we do not believe that inflation has had a material effect on our results of operations during the periods presented in this report. However, our business may be affected by inflation in the future.

Foreign Currency Exchange Risk

We are subject to inherent risks attributed to operating in a global economy. Virtually all of our revenue, receivables, purchases and debts are denominated in U.S. dollars.

Item 4. Controls and Procedures.

(a) Evaluation of Disclosure Controls and Procedures.

We maintain disclosure controls and procedures that are designed to ensure that information required to be disclosed in the reports that we file or submit under the Securities Exchange Act of 1934, as amended (the Exchange Act), is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms and is accumulated and communicated to our management, including our principal executive officer and principal financial officer, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure.

As of September 30, 2020, our management, with the participation of our principal executive officer and principal financial officer, evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act). Our management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives, and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on such evaluation, our principal executive officer and principal financial officer have concluded that, as of September 30, 2020, our disclosure controls and procedures were effective to ensure that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and is accumulated and communicated to our management, including our principal executive officer and principal financial officer, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure. In addition, our principal executive officer and principal financial officer have concluded that the impact of the COVID-19 pandemic did not impact our ability to maintain our internal controls over financial reporting and disclosure controls and procedures.

(b) *Changes in Internal Controls.*

During the nine months ended September 30, 2020, there were no changes in our internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15(d)-15(f) promulgated under the Exchange Act, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

PART II — OTHER INFORMATION

Item 1. Legal Proceedings.

Patent Enforcement Actions

In May 2016, we filed a complaint for patent infringement against Nano Tech Co., Ltd. (Nano), and Guangdong Alison Hi Tech., Ltd. (Alison) in the International Trade Commission, or ITC. In the ITC complaint, we alleged that these two China-based companies have engaged and are engaging in unfair trade practices by importing aerogel products in the United States that infringe, and/or are manufactured by processes that infringe, several of our patents in violation of Section 337 of the Tariff Act of 1930. In February 2018, the ITC issued its final determination confirming the Administrative Law Judge, or ALJ's, previous initial determination that Nano and Alison had infringed asserted Aspen patents and that they have not proven the patents are invalid except with respect to one dependent product claim, which the ITC found was not infringed. The ITC affirmed that Alison and Nano each violated Section 337 of the Tariff Act and issued a limited exclusion order prohibiting importation of infringing aerogel insulation products manufactured by Alison and Nano. Alison unsuccessfully appealed the ITC determination with respect to a product patent to the United States Court of Appeals for the Federal Circuit (CAFC), which affirmed the validity of our patent. The exclusion order, which is enforced by the United States Customs and Border Protection, is currently in effect.

Additionally, the United States Patent and Trademark Office, or USPTO, denied Alison's requests to invalidate the claims of four of our patents in Inter-Partes Review. Alison also filed multiple similar requests with the Chinese Patent Office, or SIPO, seeking to invalidate our Chinese manufacturing process patents and two of our Chinese product patents. With respect to one of those requests, not withdrawn previously by Alison, the Patent Reexamination Board of SIPO (PRB), issued a decision upholding the validity of Aspen's issued patent as amended in the proceedings. Alison has appealed the PRB's decision to the Beijing IP court. On July 25, 2020, the Beijing IP court dismissed Alison's appeal and upheld the validity of Aspen's patent and we received this decision on September 15, 2020. Nano has also filed a request seeking invalidation of a product patent at PRB of SIPO on which the oral hearing took place in July 2019. After the oral hearing, Nano withdrew its invalidation request. On September 23, 2019, Alison filed another request to invalidate the same patent, whose prior validity holding by PRB was then on appeal at the Beijing IP Court. After conducting an oral hearing, PRB issued a decision on January 23, 2020 denying Alison's latest invalidation request of this patent.

In April 2016, we also filed a patent infringement suit at the District Court in Mannheim, Germany (Mannheim court), against Nano, Alison and two European resellers asserting their infringement of one of our German patents. We subsequently asserted infringement of another three patents against Nano, Alison and a European reseller of Alison's products at the Mannheim court. We have since settled with one European reseller in exchange for a commitment not to procure infringing products and cooperation with our case. Key events in connection with our patent enforcement in Europe are summarized below:

- In January 2018, the court issued a series of judgments by acknowledgement (German, "Anerkenntnisurteil") finding the second reseller, Hiltex, liable for infringement and also issued injunctions against Hiltex. The judgments resulted from a settlement agreement in which Hiltex agreed not to resell the infringing products in Europe where at least one of the asserted patents are active. Nano and Alison also initiated nullity actions in German Federal Patent Court in Munich against our asserted German patents.
- Nano and Alison also filed an opposition to one of the asserted patents at the European Patent Office (EPO). In December 2018, the opposition division of EPO determined the patent, EP2813338 (338 Patent), was invalid on formality grounds and decided to revoke it, which determination is currently under appeal at the EPO Board of appeals. On March 19 and 20, 2019 the German Federal Patent Court in Munich (FPC) conducted oral proceedings and voided four claims in EP2415577 (577 Patent) and confirmed the validity of challenged claims in EP2422950 (950 Patent) within the scope of silica gels. These FPC judgments are now final and binding on the parties. Nano has filed another nullity action seeking to invalidate the remaining claims in the 577 Patent which was subsequently terminated due to Nano's failure to provide legally required security for costs. On June 17, 2020, Nano also filed an opposition to a recently issued Aspen Patent EP3120983B1, titled "Continuous Sheet of Gel Materials and Continuous sheet of Aerogel".
- On March 8, 2019, the Mannheim court issued two separate judgments in cases against Nano and Alison, respectively. The Mannheim court determined that both Nano and Alison are infringing on Aspen's EP1638750 (750 Patent) in connection with their respective products. The court also issued injunctions prohibiting the offer, putting on the market, using, importing or possessing the infringing products. The court found the defendants liable to us for damages since September 22, 2012. The court also ordered the defendants to provide information on the scope of the acts of infringement committed since August 22, 2012, and a recall of infringing products. The court ordered Nano and Alison to bear the costs of the legal proceedings and reimburse statutory attorneys' costs and expenses to us, that exact amount of which is yet to be determined. Nano and Alison have appealed the judgments of the Mannheim court. The appeal is currently ongoing. The Federal Patent Court in Munich previously dismissed the challenge to the validity of 750 Patent which has become final.

- The Mannheim court issued two decisions on December 23, 2019 finding that Alison infringed the 577 Patent and the 950 Patent and also issued injunctions prohibiting Alison from continuing infringement in connection with any aerogel sheets. The December 2019 decisions against Alison have now become final and binding.
- The Mannheim court issued two decisions on July 31, 2020 finding that Nano infringed each of the 577 Patent and the 950 Patent. In addition to granting other remedies, the court also issued injunctions prohibiting the offer, putting on the market, using, importing or possessing any aerogel sheets. While these decisions are subject to an appeal to the Higher Regional Court in Karlsruhe within a month of their respective service to the parties, counsel to Nano has informally confirmed that no appeal was timely filed. We expect any formal confirmation of the finality of the Mannheim court decisions to occur in due course albeit with certain delay due to COVID-19 pandemic restrictions.

Additionally, a reseller of Nano's products in Taiwan challenged the validity of one of our patents in Taiwan in 2018. After careful review of our written response, the Taiwanese patent office has determined the patent as valid and dismissed the challenge in December 2018. In 2018, LG Chem Ltd. challenged the validity of one of our patents in Korea at the Intellectual Property Trial and Appeals Board (IPTAB) of the Korean Intellectual Property Office. After conducting an oral hearing, the IPTAB issued a decision on November 30, 2019 upholding claims related to aerogel sheets incorporating fibers and invalidating claims for aerogel sheets not incorporating fibers. The IPTAB decision is currently on appeal at the Korean Patent Court.

Due to their nature, it is difficult to predict the outcome or the costs involved in any litigation or administrative proceedings, including any appeals process. Furthermore, the counter-parties in these proceedings may have significant resources and interest to litigate and therefore, these litigation matters could be protracted and may ultimately involve significant legal expenses. In addition to the foregoing, we have been and may be from time to time a party to other legal proceedings that arise in the ordinary course of business and to other patent enforcement actions to assert our patent rights.

Brazilian Enforcement Action

In August 2018, we filed an enforcement suit against Qualiman Engenharia E Montagens LTDA, or Qualiman, one of our South American customers, in civil court in Sao Paulo, Brazil seeking payment of past due invoices totaling approximately \$2.9 million. In October 2018, the Brazilian court ruled in our favor with respect to Qualiman's obligation to pay us immediately. As part of the remedy, the Court ordered Qualiman's customer, Petroleo Brasileiro S.A., or Petrobras, to redirect part of its payments to Qualiman to a court-administered bank account and other appropriate actions. Subsequently, we learned that Qualiman has laid off a substantial portion of its installers and threatened to walk away from Petrobras' contract. In connection with such layoffs, a Brazilian labor court is addressing reparations to laid-off workers. We learned that Petrobras and Qualiman are seeking to renegotiate the contract between them in connection with this project. On February 26, 2019, an appeals court dismissed Qualiman's appeal of the decision of the Sao Paulo civil court on the merits. Subsequent to this ruling, we recovered \$0.3 million through these court actions. Additional recovery of unpaid amounts is unlikely due to Qualiman's filing of judicial reorganization under Brazilian laws and its consequences on our recovery action.

Item 1A. Risk Factors.

Other than the risk factor(s) provided below, there have been no material changes in our risk factors from those disclosed in Part I, Item 1A, "Risk Factors," in our Annual Report.

Our business, results of operations and financial condition could be materially adversely affected by the effects of widespread public health epidemics, including coronavirus and the resulting COVID-19 pandemic, that are beyond our control.

Any outbreaks of contagious diseases, public health epidemics and other adverse public health developments in countries where we, our customers and suppliers operate could have a material and adverse effect on our business, results of operations and financial condition. The recent novel strain of the coronavirus, initially limited to a region in China and now affecting the global community, including the United States, is expected to impact our operations, and the nature and extent of the impact may be highly uncertain and beyond our control. In particular, our sales globally, including to customers in the energy infrastructure and building materials markets that are impacted by the COVID-19 pandemic, are being negatively impacted as a result of disruption in demand, which could have a material adverse effect on our business, results of operations and financial condition. The COVID-19 pandemic has led to unprecedented drops in the demand for oil, which compounded with an increase or announced increase in output of oil by certain oil exporting countries has resulted in significant volatility in the price of oil, which may severely impact the demand for our products used in energy infrastructure facilities. In response to this general uncertainty in the market for our products, we have taken a number of actions to reduce expenses, including wage reductions, temporary suspension of board fees and selected reductions to discretionary expenses. In addition, as permitted by the CARES Act, we have elected to defer certain payments of the employer share of Social Security tax that would otherwise be required to be paid during the period beginning on March 27, 2020 and ending December 31, 2020. The CARES Act allows employers to deposit 50 percent of the deferred taxes on or before December 31, 2021, and the

remaining 50 percent by December 31, 2022. We may also temporarily curtail operations in our East Providence, Rhode Island manufacturing facility if necessary to ensure the safety of our employees or to align capacity with demand. However, such actions or any future actions we take may not be sufficient to offset the effects of potential reduction in sales as a result of any disruption in demand. Furthermore, suppliers of our raw materials may not be able to supply the materials that we require to manufacture our products according to our schedules and specifications. If our suppliers' operations are impacted, we may need to seek alternate suppliers, which may be more expensive, may not be possible or may result in delays, each of which would affect the results of our operations. The duration of such a disruption, and related financial impact to us, cannot be accurately estimated at this time.

Uncertain factors relating to the COVID-19 pandemic include the duration of the outbreak, the severity of the disease, and the actions, or perception of actions that may be taken, to contain or treat its impact, including declarations of states of emergency, business closures, manufacturing restrictions and a prolonged period of travel, commercial and/or other similar restrictions and limitations. While the potential economic impact brought by and the duration of the coronavirus outbreak may be difficult to assess or predict, a widespread pandemic could result in significant or sustained disruption of global financial markets, reducing our ability to access capital, which could in the future negatively affect our liquidity. In addition, while we believe we have taken appropriate steps to maintain a safe workplace to protect our employees from contracting and spreading the coronavirus, including following the guidance set out from both the Occupational Safety and Health Administration and Centers for Disease Control and Prevention, we may not be able to prevent the spread of the virus among our employees, face litigation or other proceedings making claims related to unsafe working conditions, inadequate protection of our employees or other claims. Any of these claims, even if without merit, could result in costly litigation or divert management's attention and resources. Furthermore, we may face a sustained disruption to our operations due to one or more of the factors described above.

Our wholly-owned subsidiary, Aspen Aerogels Rhode Island, LLC, or the Borrower, applied for and received a loan under the Paycheck Protection Program of the CARES Act, or the PPP, pursuant to which there is no guarantee that a loan may be forgiven and we may be subjected to challenges, reviews, and investigations regarding qualification or certifications made in the application for the loan. In addition, the Borrower may be subject to audit in connection with the loan and should the Borrower request that the loan be forgiven, the United States Small Business Administration, or SBA, will conduct a full audit in connection with the loan. If there is any adverse finding from the audit or if Borrower is subject to any other investigation or challenge in connection with the loan, the Borrower could be required to return the full amount of the PPP Loan plus interest, which could reduce our liquidity, and could be subject to significant fines, damages and penalties and its business could otherwise be adversely affected, whether or not there is an adverse finding. As the Borrower's parent, such events could have a material adverse effect on our business, financial condition and results of operations.

On May 1, 2020, the Borrower entered into a promissory note, or the PPP Loan Documents, to receive a loan, or the loan, pursuant to the PPP established under the CARES Act in the aggregate amount of approximately \$3.7 million, or the Loan Proceeds. Under the terms of the CARES Act, recipients of PPP loans from SBA, or PPP Loans, can elect to apply for forgiveness for all or a portion of a PPP Loan after eight weeks or 24 weeks. Such forgiveness will be determined, subject to limitations, based on the use of loan proceeds during a specified eight-week period for payroll costs and mortgage interest, for rent or utility costs and for the maintenance of employee staffing and compensation levels, although no more than 25% of the amount forgiven can be attributable to non-payroll costs. No assurance is provided that the Borrower will elect to pursue forgiveness of all or a portion of the loan or be eligible for and obtain forgiveness of all or a portion of the loan. If the Borrower elects not to pursue or is unable to qualify for or obtain forgiveness of all or a portion of the loan, our liquidity could be reduced and our business, financial condition and results of operations may be adversely affected. Pursuant to the requirements under the CARES Act, in connection with the loan, the Borrower certified that current economic uncertainty makes the loan request necessary to support the ongoing operations of the Borrower. We believe that the Borrower made such certification in a manner consistent with SBA guidance that borrowers must make the certification in good faith, taking into account their current business activity and their ability to access other sources of liquidity sufficient to support their ongoing operations in a manner that is not significantly detrimental to the business. While we believe the Borrower's prior and future certifications were and will be well supported on the dates certified, in light of the understandings of the requirements and the assessment made on the certification date, we cannot be certain that SBA or any other governmental entity or third party will concur with the Borrower, especially in light of the press scrutiny and SBA's evolving guidance and views and the eventual extent of the impact of current economic uncertainties on Borrower's operations. Further, although the Borrower conferred with representatives of SBA prior to finalizing the loan, we cannot be certain that as subsidiary of a public company, the Borrower might not be deemed to have improperly made the required certifications, including that current economic uncertainty makes the loan request necessary to support the ongoing operations of the Borrower, taking into account the Borrower's current business activity and ability to access other sources of liquidity sufficient to support its ongoing operations in a manner that is not significantly detrimental to the business.

Subsequent to the Borrower's application for the loan, SBA issued various interpretive guidelines in connection with the PPP, including guidance on how SBA interprets certain of the certification requirements. One of the interpretations appears to be in response to various press reports that well established or well capitalized private and public companies were able to secure PPP loans that were meant for smaller companies. SBA's interpretive guidelines published on April 23, 2020 set forth that public companies with substantial market value and access to capital markets would qualify to participate in the PPP and SBA advised any such public company to be prepared to provide the basis for the certifications upon SBA request. Subsequently, on April 28, 2020 the Secretary of the Treasury and Small Business Administrator announced that the government will conduct a full audit of all PPP loans of more than \$2.0 million for which the borrower applies for forgiveness. As the Borrower expects it will be audited or reviewed by SBA or the U.S. Department of the Treasury if it files an application for forgiveness, and, whether or not it elects to seek forgiveness of all or part of the loan, it could be subject to investigation, audit or other review by governmental agencies or claims by third parties, with respect to whether it qualified for an PPP Loan, or whether the certifications it made to obtain the loan are accurate, or other matters. There is a risk that any such audit, review, investigation or claim could result in the diversion of our management's time and attention, in the need to incur significant legal expenses and in the possibility that we will sustain reputational injuries. If the Borrower were to be audited, investigated, reviewed or subject to suit and if there is any adverse finding in such audit, investigation, review or suit or if the Borrower were alleged, or determined, not to qualify for the loan or alleged, or found, to have made false certifications in connection with the loan, the Borrower could be required to return the full amount of the PPP Loan, which would reduce our liquidity, and would subject it to fines and penalties, and exclusion from government contracts. In particular, the Borrower may become subject to actions under the federal False Claims Act, or the FCA, including its qui tam provisions, which, among other things, prohibits persons from knowingly filing, or knowingly causing to be filed, a false statement, or knowingly using a false statement, to obtain payment from the federal government. Violations of the FCA are subject to treble damages and penalties. In the case of a PPP Loan, the government could allege that single damages are the amount of the loan and interest thereon (or more), which under the FCA could then be trebled. Substantial penalties must also be imposed for each submitted false statement when a defendant loses a FCA trial. FCA cases may be initiated by the U.S. Department of Justice or by private persons or entities, often called "whistleblowers," who bring the action on behalf of the United States. The Borrower may also face enforcement arising under other federal statutes, including criminal laws, and administrative actions and investigations initiated by SBA or other governmental entities. Furthermore, if the Borrower is identified as an entity that the media, government officials or others seek to portray it as a business that should not have availed itself of PPP funding, the Borrower may face negative publicity, which could have a materially adverse impact on its business and operations and on our business and operations as its parent.

Our efforts in developing and selling products in electric vehicle markets, including the recent contract with a U.S. automotive OEM and any future supply of our products to the automotive industry may subject us to increased financial, operational and legal risks that could materially adversely impact our business, financial conditions and results of operations and may also increase our costs and make it difficult for us to operate profitably.

We have a focus on developing and selling products in the automotive industry, specifically for electric vehicle applications. We have recently entered into a contract with a U.S. automotive OEM to supply our thermal barrier products for use in the batteries of electric vehicles and we are continuing efforts to develop further products and sell to others in the electric vehicle market. As a result of our existing contract with the automotive OEM and any future supply of our products to the automotive industry, including through specific contracts, we are subject to a number of risks, including, but not limited to:

- Under our contract with a U.S. automotive OEM, the U.S. automotive OEM is not obligated to make any purchases from us and may terminate the contract at any time. There can be no assurance that significant revenue, or any revenue at all, will result from the contract.
- In order to support the projections and estimates of our product demand that our potential automotive customers present to us, we may need to make substantial capital and other investments without any assurance that such potential demand will materialize. For example, under the contract with the U.S. automotive OEM, we are obligated to supply products up to a daily maximum quantity even without a specific purchase commitment. This requires us to invest in capacity, infrastructure and personnel. These investments could result in substantial capital expenditures without any commensurate increase in revenue, or any increase at all. Even if significant sales of our products to automotive OEMs materialize, the need to make these significant capital investments, as well as the costs related to developing these products and related process and manufacturing developments, and the costs of meeting the stringent requirements of the automotive industry, could result in sales to the automotive industry being significantly less profitable than we expect, or potentially unprofitable.
- Automotive OEMs require that we timely meet stringent requirements with respect to capital investment and quality standards in connection with our efforts to develop, sell and support products for use in the electric vehicle market. We may not be able to meet these requirements on a timely basis or at all.
- Automotive OEMs require suppliers of various tiers to assume liability for ordinary warranty expenses and product liability issues that are not necessarily commensurate with the roles the supplier played in the development of the final

product sold to the consumer. This could expose us to significantly greater risk of liability for warranty expenses and/or for defects, failures or accidents involving the final products sold to the consumer.

- Automotive OEMs purchasing from us may have certain rights to intellectual property developed by us in connection with our work for that OEM. These rights could permit the OEM to purchase products similar to ours from other third party suppliers or to develop internally products that could replace our products in their manufacturing process.
- We face significant competition in selling our products to the automotive industry and anticipate that competition increasing over time, both from products similar to ours and from other technologies that may address in a superior fashion the technical issues currently addressed by our products. In particular, we face significant competition from Chinese firms, many of whom have longstanding experience in supplying electric vehicle OEMs and are part of a Chinese electric vehicle industry that we believe is in many ways more mature than the electric vehicle industry in the United States and other markets. In order to compete with such firms and sustainably participate in the automotive market, we will have to overcome the advantages possessed by those Chinese firms.
- Electric vehicles and battery technologies are evolving at a rapid pace. They may evolve in such a way as to render our products obsolete. While we are investing considerable capital and other resources based on what we believe to be the currently identified needs of the industry, our belief as to the current needs of the industry may be incorrect or our technology, products or other resources may not be applicable to the future needs of the industry.

Our ability to successfully sell our products to the automotive industry will depend in large part on our ability to manage these and other risks.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds.

(a) *Unregistered Sales of Equity Securities.* Not applicable.

(b) *Use of Proceeds from Initial Public Offering of Common Stock.* Not applicable.

(c) *Purchases of Equity Securities By the Issuer and Affiliated Purchasers.* We did not repurchase any of our equity securities during the quarter ended September 30, 2020.

Item 3. Defaults Upon Senior Securities.

None.

Item 4. Mine Safety Disclosures.

Not applicable.

Item 5. Other Information.

On November 5, 2020, we entered into a Sales Agreement (Sales Agreement) with B. Riley Securities, Inc. (B. Riley) with respect to an at-the-market offering program under which we may offer and sell, from time to time at our sole discretion, shares of our common stock, par value \$0.00001 per share (Common Stock), having an aggregate offering price of up to \$33,871,250 (Placement Shares) through B. Riley as our sales agent. The issuance and sale, if any, of the Placement Shares by us under the Sales Agreement is subject to the continued effectiveness of our registration statement on Form S-3 that was declared effective by the Securities and Exchange Commission on September 18, 2018. The Company makes no assurances as to the continued effectiveness of the registration statement.

B. Riley may sell the Placement Shares by any method permitted by law deemed to be an “at the market” offering as defined in Rule 415 of the Securities Act of 1933, as amended, including, without limitation, sales made through The New York Stock Exchange or on any other existing trading market for the Common Stock. B. Riley will use commercially reasonable efforts to sell the Placement Shares from time to time, based upon instructions from us (including any price, time or size limits or other customary parameters or conditions we may impose). We will pay B. Riley a commission equal to three percent (3.0%) of the gross sales proceeds of any Placement Shares sold through B. Riley under the Sales Agreement, and we have also provided B. Riley with customary indemnification and contribution rights.

We are not obligated to make any sales of Common Stock under the Sales Agreement. The offering of our common stock pursuant to the Sales Agreement will terminate upon the termination of the sales agreement as described therein. We and B. Riley may

each terminate the Sales Agreement at any time upon five days' prior notice and B. Riley Securities may terminate the Sales Agreement immediately upon notice upon the occurrence of certain specified events.

The foregoing description of the Sales Agreement does not purport to be complete and is qualified in its entirety by reference to the full text of the Sales Agreement, a copy of which is filed as Exhibit 10.2 to this Quarterly Report on Form 10-Q and incorporated herein by reference.

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., our counsel, has issued a legal opinion relating to the validity of the Placement Shares being offered pursuant to the Sales Agreement. A copy of such legal opinion, including the consent included therein, is filed as Exhibit 5.1 to this Quarterly Report on Form 10-Q and is incorporated herein by reference.

Item 6. Exhibits.

(a) Exhibits

- 5.1 [Opinion of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.](#)
- 10.1 [Eleventh Amendment to the Amended and Restated Loan and Security Agreement, dated September 25, 2020, by and between the Company and Silicon Valley Bank.](#)
- 10.2 [At Market Issuance Sales Agreement, dated November 5, 2020, by and between the Company and B. Riley Securities, Inc.](#)
- 23.1 Consent of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C. (included in Exhibit 5.1 hereto)
- 31.1 [Certification of principal executive officer under Section 302\(a\) of the Sarbanes-Oxley Act of 2002.](#)
- 31.2 [Certification of principal financial officer under Section 302\(a\) of the Sarbanes-Oxley Act of 2002.](#)
- 32 [Certifications of the principal executive officer and the principal financial officer under Section 906 of the Sarbanes-Oxley Act of 2002.](#)
- 101.INS XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
- 101.SCH Inline XBRL Taxonomy Extension Schema Document.
- 101.CAL Inline XBRL Taxonomy Extension Calculation Linkbase Document.
- 101.DEF Inline XBRL Taxonomy Extension Definition Linkbase Document.
- 101.LAB Inline XBRL Taxonomy Extension Label Linkbase Document.
- 101.PRE Inline XBRL Taxonomy Extension Presentation Linkbase Document.
- 104 Cover Page Interactive Data File (embedded within the Inline XBRL document).

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

ASPEN AEROGELS, INC.

Date: November 5, 2020

By: /s/ Donald R. Young
Donald R. Young
President and Chief Executive Officer
(principal executive officer)

Date: November 5, 2020

By: /s/ John F. Fairbanks
John F. Fairbanks
Vice President, Chief Financial Officer and Treasurer
(principal financial officer and principal accounting officer)



One Financial Center
 Boston, MA 02111
 617 542 6000
 mintz.com

Aspen Aerogels, Inc.
 30 Forbes Road, Building B
 Northborough, MA 01532

November 5, 2020

Ladies and Gentlemen:

This opinion is furnished to you in connection with a Prospectus Supplement, dated November 5, 2020, to a Prospectus dated September 18, 2018 (the "Prospectus and Prospectus Supplement"), filed pursuant to a Registration Statement on Form S-3, Registration No. 333-227158 (the "Registration Statement"), filed by Aspen Aerogels, Inc., a Delaware corporation (the "Company"), with the Securities and Exchange Commission (the "Commission") under the Securities Act of 1933, as amended (the "Securities Act"), with respect to the sale of up to \$33,871,250 of shares (the "Shares") of common stock, \$0.00001 par value per share (the "Common Stock"), of the Company. The Shares are being sold pursuant to an At Market Issuance Sales Agreement, dated as of November 5, 2020, by and between the Company and B. Riley Securities, Inc. (the "Agreement"), pursuant to which the Company may issue and sell the Shares pursuant to the Registration Statement and the Prospectus and Prospectus Supplement.

In connection with this opinion, we have examined the Company's Restated Certificate of Incorporation and Restated Bylaws, both as currently in effect; the minutes of all pertinent meetings of directors of the Company relating to the Registration Statement, the Prospectus and Prospectus Supplement and the transactions contemplated thereby; such other records of the corporate proceedings of the Company and certificates of the Company's officers as we have deemed relevant for the purposes of rendering the opinions in this letter; the Registration Statement and the exhibits thereto filed with the Commission; the Prospectus and Prospectus Supplement; and the Agreement.

In our examination, we have assumed the genuineness of all signatures, the legal capacity of natural persons, the authenticity of all documents submitted to us as originals, the conformity to original documents of all documents submitted to us as certified, photostatic or facsimile copies and the authenticity of the originals of such copies.

Based upon the foregoing, and subject to the limitations set forth below, we are of the opinion that the Shares, when issued by the Company out of the Company's duly authorized Common Stock and issued and delivered by the Company against payment therefor as contemplated by the Agreement and an Placement Notice (as defined in the Agreement) properly delivered by the Company, will be duly and validly issued, fully paid and non-assessable.

Our opinion is limited to the General Corporation Law of the State of Delaware, and we express no opinion with respect to the laws of any other jurisdiction. No opinion is expressed herein with respect to the qualification of the Shares under the securities or blue sky laws of any state or any foreign jurisdiction.

We have relied as to certain matters on information obtained from public officials, officers of the Company, and other sources believed by us to be responsible.

Please note that we are opining only as to the matters expressly set forth herein, and no opinion should be inferred as to any other matters. This opinion is based upon currently existing statutes, rules, regulations and judicial decisions, and we disclaim any obligation to advise you of any change in any of these sources of law or subsequent legal or factual developments which might affect any matters or opinions set forth herein.

We hereby consent to the filing of this opinion as an exhibit to the Registration Statement in accordance with the requirements of Item 601(b)(5) of Regulation S-K under the Securities Act and to the use of this Firm's name therein and in the prospectus included therein with respect to the Shares under the caption "Legal Matters." In giving such consent, we do not hereby admit that we are in the category of persons whose consent is required under Section 7 of the Securities Act or the rules and regulations of the Commission.

Very truly yours,

/s/ Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.
 Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.

BOSTON LONDON LOS ANGELES NEW YORK SAN DIEGO SAN FRANCISCO WASHINGTON

MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C.

**ELEVENTH AMENDMENT
TO
AMENDED AND RESTATED LOAN AND SECURITY AGREEMENT**

This Eleventh Amendment to Amended and Restated Loan and Security Agreement (this “**Amendment**”) is entered into this 25th day of September, 2020 by and between **SILICON VALLEY BANK** (“**Bank**”) and **ASPEN AEROGELS, INC.**, a Delaware corporation (“**Borrower**”) whose address is 30 Forbes Road, Building B, Northborough, Massachusetts 01532.

RECITALS

A. Bank and Borrower have entered into that certain Amended and Restated Loan and Security Agreement dated as of September 3, 2014, as amended by that certain Consent and First Amendment to Amended and Restated Loan and Security Agreement dated as of August 19, 2016, as further amended by that certain Second Amendment to Amended and Restated Loan and Security Agreement dated as of November 23, 2016, as further amended by that certain Third Amendment to Amended and Restated Loan and Security Agreement dated as of December 29, 2016, as further amended by that certain Fourth Amendment to Amended and Restated Loan and Security Agreement dated as of January 27, 2017, as further amended by that certain Fifth Amendment to Amended and Restated Loan and Security Agreement dated as of September 27, 2017, as further amended by that certain Consent and Sixth Amendment to Amended and Restated Loan and Security Agreement dated as of January 25, 2018, as further amended by that certain Seventh Amendment to Amended and Restated Loan and Security Agreement dated as of April 25, 2018, as further amended by that certain Eighth Amendment to Amended and Restated Loan and Security Agreement and First Amendment to Preemptive Forbearance and Conditional Waiver Agreement dated as of November 30, 2018, as further amended by that certain Ninth Amendment to Amended and Restated Loan and Security Agreement dated as of March 4, 2019, and as further amended by that certain Tenth Amendment to Amended and Restated Loan and Security Agreement dated as of March 3, 2020 (as amended, and as the same may from time to time be further amended, restated, amended and restated, modified and/or supplemented, the “**Loan Agreement**”).

B. Bank has extended credit to Borrower for the purposes permitted in the Loan Agreement.

C. Borrower has requested that Bank amend the Loan Agreement to make certain revisions to the Loan Agreement as more fully set forth herein.

D. Bank has agreed to so amend certain provisions of the Loan Agreement, but only to the extent, in accordance with the terms, subject to the conditions and in reliance upon the representations and warranties set forth below.

AGREEMENT

Now, **THEREFORE**, in consideration of the foregoing recitals and other good and valuable consideration, the receipt and adequacy of which is hereby acknowledged, and intending to be legally bound, the parties hereto agree as follows:

1. Definitions. Capitalized terms used but not defined in this Amendment shall have the meanings given to them in the Loan Agreement.

2. Amendments to Loan Agreement.

2.1 Section 2.4 (Payment of Interest on the Credit Extensions). Subsection (a) Section 2.4 is amended in its entirety and replaced with the following:

“(a) Interest; Payment. Each Advance shall bear interest on the outstanding principal amount thereof from the date when made, continued or converted until paid in full at a

rate per annum equal to the greater of (i) four percent (4.00%) and (ii) (A) for Prime Rate Advances, the Prime Rate plus the applicable Prime Rate Margin, and (B) during a Streamline Period, for LIBOR Advances, the LIBOR Rate plus the applicable LIBOR Rate Margin. On and after the expiration of any Interest Period applicable to any LIBOR Advance outstanding on the date of the occurrence of an Event of Default or acceleration of the Obligations, the amount of such LIBOR Advance shall, during the continuance of such Event of Default, at the Bank's option, bear interest at the Default Rate, unless Bank otherwise elects from time to time in its sole discretion to impose a smaller increase. Pursuant to the terms hereof, interest on each Advance shall be paid in arrears on each Interest Payment Date. On and after the expiration of any Interest Period applicable to any LIBOR Advance outstanding on the date when Borrower fails to maintain the Streamline Threshold and a Streamline Period is no longer in effect, at the Bank's option, the amount of such LIBOR Advance shall bear interest at the Prime Rate plus the applicable Prime Rate Margin. Interest shall also be paid on the date of any prepayment of any Advance pursuant to this Agreement for the portion of any Advance so prepaid and upon payment (including prepayment) in full thereof. All accrued but unpaid interest on the Advances shall be due and payable on the Revolving Line Maturity Date. Notwithstanding anything to the contrary contained herein, LIBOR Advances shall only be available to Borrower during a Streamline Period."

2.2

Section 6.9 (Financial Covenants). Section 6.9 is amended in its entirety and replaced with the following:

"6.9 Financial Covenant. Borrower shall achieve, measured as of the end of each fiscal quarter during the following periods, EBITDA of at least (loss not worse than) the following for the following periods:

Period	Minimum EBITDA (maximum loss)
Trailing three (3) month period ending March 31, 2020	(\$4,500,000)
Trailing six (6) month period ending June 30, 2020	(\$6,500,000)
Trailing nine (9) month period ending September 30, 2020	(\$5,000,000)
Trailing twelve (12) month period ending December 31, 2020	(\$7,000,000)"

2.3

Section 13 (Definitions). The following term and its definition set forth in Section 13.1 is amended in its entirety and replaced with the following:

"Borrowing Base" is (a) eighty percent (80%) of Eligible Accounts, plus (b) eighty percent (80%) of Eligible Foreign Accounts (provided, however, Eligible Foreign Accounts that are billed in a Foreign Currency shall have an advance rate of seventy percent (70%); provided, further, that to the extent Eligible Foreign Accounts include BASF Receivables, such calculation shall be net of any credits Borrower is required to provide to BASF in connection with the BASF Receivables due to each Pre-Payment pursuant to the Supply Agreement; and provided, further, that to the extent Eligible Foreign Accounts include PTT LNG Receivables, such calculation shall be net of any credits Borrower is required to provide to Saipem S.A., CTCI Corporation, and/or SPCC Joint Venture in connection with the PTT LNG Receivables due to each prepayment pursuant to the PTT LNG Supply Agreement), provided, that, the availability under this

subsection (b) plus the availability under subsection (c) below shall not exceed seventy-five percent (75%) of the Borrowing Base, plus (c) (i) when a Streamline Period is not in effect, the lesser of eighty percent (80%) of Eligible Specified Accounts or One Million Dollars (\$1,000,000) and (ii) during a Streamline Period, eighty percent (80%) of Eligible Specified Accounts (and with respect to subsections (c)(i) and (c)(ii) hereof, when added to the availability under subsection (b) above, in each case subject to the overall cap set forth in subsection (b) above), as determined by Bank from Borrower's most recent Borrowing Base Report (and as may subsequently be updated by Bank in Bank's sole discretion based upon information received by Bank including, without limitation, Accounts that are paid and/or billed following the date of the Borrowing Base Report); provided, however, that Bank may decrease the foregoing amounts and percentages in its good faith business judgment based on events, conditions, contingencies, or risks which, as determined by Bank, may adversely affect the Collateral."

2.4 **Section 13 (Definitions).** The following new defined terms are hereby inserted in Section 13.1, each in the appropriate alphabetical order:

" "PTT LNG" means PTT LNG Company Limited, a company organized under the laws of Thailand, its affiliates, assignees or designees."

" "PTT LNG Receivables" means Accounts owing from Saipem S.A., CTCI Corporation, and/or SPCC Joint Venture to Borrower from sales pursuant to the PTT LNG Supply Agreement which constitute Eligible Foreign Accounts."

" "PTT LNG Supply Agreement" means that certain purchase order dated March 11, 2019 and accepted April 11, 2019 by and between Borrower and Saipem S.A. and CTCI Corporation collectively as SPCC Joint Venture for supply of products for use in an LNG Terminal project of PTT LNG, as amended, modified, supplemented or restated from time to time."

2.5 **Exhibit B (Compliance Certificate).** The Compliance Certificate attached to the Loan Agreement as Exhibit B is amended in its entirety and replaced with the Compliance Certificate in the form of Exhibit B attached hereto.

3. **Limitation of Amendments.**

3.1 The amendments set forth in Section 2 above are effective for the purposes set forth herein and shall be limited precisely as written and shall not be deemed to (a) be a consent to any amendment, waiver or modification of any other term or condition of any Loan Document, or (b) otherwise prejudice any right or remedy which Bank may now have or may have in the future under or in connection with any Loan Document.

3.2 This Amendment shall be construed in connection with and as part of the Loan Documents and all terms, conditions, representations, warranties, covenants and agreements set forth in the Loan Documents, except as herein amended, are hereby ratified and confirmed and shall remain in full force and effect.

4. **Representations and Warranties.** To induce Bank to enter into this Amendment, Borrower hereby represents and warrants to Bank as follows:

4.1 Immediately after giving effect to this Amendment (a) the representations and warranties contained in the Loan Documents are true, accurate and complete in all material respects as of the date hereof (except to the extent such representations and warranties relate to an earlier date, in which case they are true and correct as of such date), and (b) no Event of Default has occurred and is continuing;

4.2 Borrower has the power and authority to execute and deliver this Amendment and to perform its obligations under the Loan Agreement, as amended by this Amendment;

4.3 The organizational documents of Borrower delivered to Bank on the Effective Date remain true, accurate and complete and have not been amended, supplemented or restated and are and continue to be in full force and effect;

4.4 The execution and delivery by Borrower of this Amendment and the performance by Borrower of its obligations under the Loan Agreement, as amended by this Amendment, have been duly authorized;

4.5 The execution and delivery by Borrower of this Amendment and the performance by Borrower of its obligations under the Loan Agreement, as amended by this Amendment, do not and will not contravene (a) any law or regulation binding on or affecting Borrower, (b) any contractual restriction with a Person binding on Borrower, (c) any order, judgment or decree of any court or other governmental or public body or authority, or subdivision thereof, binding on Borrower, or (d) the organizational documents of Borrower;

4.6 The execution and delivery by Borrower of this Amendment and the performance by Borrower of its obligations under the Loan Agreement, as amended by this Amendment, do not require any order, consent, approval, license, authorization or validation of, or filing, recording or registration with, or exemption by any governmental or public body or authority, or subdivision thereof, binding on Borrower, except as already has been obtained or made; and

4.7 This Amendment has been duly executed and delivered by Borrower and is the binding obligation of Borrower, enforceable against Borrower in accordance with its terms, except as such enforceability may be limited by bankruptcy, insolvency, reorganization, liquidation, moratorium or other similar laws of general application and equitable principles relating to or affecting creditors' rights.

5. Ratification of Perfection Certificate. Borrower hereby ratifies, confirms and reaffirms, all and singular, the terms and disclosures contained in a certain Perfection Certificate dated as of March 2, 2020, and acknowledges, confirms and agrees that the disclosures and information Borrower provided to Bank in such Perfection Certificate have not changed, as of the date hereof.

6. No Defenses of Borrower. Borrower hereby acknowledges and agrees that Borrower has no offsets, defenses, claims, or counterclaims against Bank with respect to the Obligations, or otherwise, and that if Borrower now has, or ever did have, any offsets, defenses, claims, or counterclaims against Bank, whether known or unknown, at law or in equity, all of them are hereby expressly WAIVED and Borrower hereby RELEASES Bank from any liability thereunder.

7. Integration. This Amendment and the Loan Documents represent the entire agreement about this subject matter and supersede prior negotiations or agreements. All prior agreements, understandings, representations, warranties, and negotiations between the parties about the subject matter of this Amendment and the Loan Documents merge into this Amendment and the Loan Documents.

8. Counterparts. This Amendment may be executed in any number of counterparts and all of such counterparts taken together shall be deemed to constitute one and the same instrument.

9. Fees and Expenses. Borrower agrees to promptly pay Bank, upon receipt of an invoice, Bank's legal fees and expenses incurred in connection with this Amendment.

10. Effectiveness. As a condition precedent to the effectiveness of this Amendment and the Bank's obligation to make further Advances under the Revolving Line, the Bank shall have received the following documents prior to or concurrently with this Amendment, each in form and substance reasonably satisfactory to Bank:

10.1 this Amendment duly executed on behalf of Borrower;

10.2 the Acknowledgment of Amendment and Reaffirmation of Guaranty substantially in the

form attached hereto as **Schedule 1**, duly executed and delivered by Guarantor;

10.3 Borrower's payment of a fully earned, non-refundable amendment fee in the amount of Twelve Thousand Five Hundred Dollars (\$12,500), payable in full on the date hereof; and

10.4 such other documents as Bank may reasonably request.

11. Post-Closing Requirements. Within thirty (30) days after the date of this Amendment, Borrower shall deliver to Bank (i) evidence satisfactory to Bank that the insurance policies and endorsements required by Section 6.7 of the Loan Agreement are in full force and effect and (ii) long form good standing certificates of Borrower and Guarantor, certified by the jurisdiction of organization or formation of Borrower and Guarantor, respectively, each as of a date no earlier than thirty (30) days prior to the date of delivery. Failure to comply with the foregoing requirements within the time period noted, or such longer period as Bank may agree in its sole discretion, shall constitute an Event of Default for which no grace or cure period shall apply.

[Signature page follows.]

IN WITNESS WHEREOF, the parties hereto have caused this Amendment to be duly executed and delivered as of the date first written above.

BANK

SILICON VALLEY BANK

By: /s/Megan Wood

Name: Megan Wood

Title: Vice President

BORROWER

ASPEN AEROGELS, INC.

By: /s/John F. Fairbanks

Name: John Fairbanks

Title: Chief Financial Officer

**ACKNOWLEDGMENT OF AMENDMENT
AND REAFFIRMATION OF GUARANTY**

Section 1. Guarantor hereby acknowledges and confirms that it has reviewed and approved the terms and conditions of the Eleventh Amendment to Amended and Restated Loan and Security Agreement dated as of the date hereof (“the “**Amendment**”).

Section 2. Guarantor hereby consents to the Amendment and agrees that the Guaranty relating to the Obligations of Borrower under the Loan Agreement shall continue in full force and effect, shall be valid and enforceable and shall not be impaired or otherwise affected by the execution of the Amendment or any other document or instruction delivered in connection herewith.

Section 3. Guarantor represents and warrants that, after giving effect to the Amendment, all representations and warranties contained in the Guaranty are true, accurate and complete as if made the date hereof.

Dated as of September 25, 2020.

[Signature Page Follows]

GUARANTOR:

ASPEN AEROGELS RHODE ISLAND, LLC

By: /s/John F. Fairbanks

Name: John Fairbanks

Title: Chief Financial Officer

EXHIBIT B**COMPLIANCE CERTIFICATE**

TO: SILICON VALLEY BANK Date: -
 FROM: ASPEN AEROGELS, INC.

The undersigned authorized officer of Aspen Aerogels, Inc. (“**Borrower**”) certifies that under the terms and conditions of the Amended and Restated Loan and Security Agreement between Borrower and Bank (as amended and in effect, the “**Agreement**”), (1) Borrower is in complete compliance for the period ending _____ with all required covenants except as noted below, (2) there are no Events of Default, (3) all representations and warranties in the Agreement are true and correct in all material respects on this date except as noted below; provided, however, that such materiality qualifier shall not be applicable to any representations and warranties that already are qualified or modified by materiality in the text thereof; and provided, further that those representations and warranties expressly referring to a specific date shall be true, accurate and complete in all material respects as of such date, (4) Borrower, and each of its Subsidiaries, has timely filed all required tax returns and reports, and Borrower has timely paid all foreign, federal, state and local taxes, assessments, deposits and contributions owed by Borrower except as otherwise permitted pursuant to the terms of Section 5.9 of the Agreement, and (5) no Liens have been levied or claims made against Borrower or any of its Subsidiaries, if any, relating to unpaid employee payroll or benefits of which Borrower has not previously provided written notification to Bank. Attached are the required documents supporting the certification. The undersigned certifies that these are prepared in accordance with GAAP consistently applied from one period to the next except as explained in an accompanying letter or footnotes. The undersigned acknowledges that no borrowings may be requested at any time or date of determination that Borrower is not in compliance with any of the terms of the Agreement, and that compliance is determined not just at the date this certificate is delivered. Capitalized terms used but not otherwise defined herein shall have the meanings given them in the Agreement.

se indicate compliance status by circling Yes/No under “Complies” column.

<u>Reporting Covenant</u>	<u>Required</u>	<u>Complies</u>
Monthly financial statements with Compliance Certificate	Monthly within 30 days	Yes No
Quarterly financial statements	Quarterly within 45 days	Yes No
Annual financial statement (CPA Audited) + CC	FYE within 150 days	Yes No
10-Q, 10-K and 8-K	Within 5 days after filing with SEC	Yes No
Accounts Payable & A/P Agings, and Deferred Revenue reports	Monthly within 20 days	Yes No
Borrowing Base Reports	15 th and last Business Day of each month (monthly within 20 days when a Streamline Period is in effect) and with each request for a Credit Extension;	Yes No
Projections	FYE within 30 days	Yes No
All following Intellectual Property was registered after the Effective Date (if no registrations, state “none”)		

<u>Financial Covenant</u>	<u>Required</u>	<u>Actual</u>	<u>Complies</u>
Minimum EBITDA	*	\$	Yes No

*See Section 6.9

	<u>Performance Pricing</u>	<u>Applies</u>
Adjusted Quick Ratio at least 1.50:1.00	Prime + 0.75% (Eligible Accounts) or Prime + 1.25% (Eligible Foreign Accounts); LIBOR + 3.75% (Eligible Accounts) or LIBOR +4.25% (Eligible Foreign Accounts)	Yes No
Adjusted Quick Ratio less than 1.50:1.00	Prime + 1.50% (Eligible Accounts); Prime + 2.00% (Eligible Foreign Accounts)	Yes No

The following financial covenant analyses and information set forth in Schedule 1 attached hereto are true and accurate as of the date of this Certificate.

The following are the exceptions with respect to the certification above: (If no exceptions exist, state “No exceptions to note.”)

ASPEN AEROGELS, INC.

By:
Name:
Title:

BANK USE ONLY

Received by: _____
AUTHORIZED SIGNER
Date: _____
Verified: _____
AUTHORIZED SIGNER
Date: _____
Compliance Status: Yes No

Schedule 1 to Compliance Certificate

Financial Covenants of Borrower

In the event of a conflict between this Schedule and the Loan Agreement, the terms of the Loan Agreement shall govern.

I. EBITDA (Section 6.9)

Required: Borrower shall achieve, measured as of the end of each fiscal quarter during the following periods, EBITDA of at least (loss not worse than) the following for the following periods:

Period	Minimum EBITDA (maximum loss)
Trailing three (3) month period ending March 31, 2020	(\$4,500,000)
Trailing six (6) month period ending June 30, 2020	(\$6,500,000)
Trailing nine (9) month period ending September 30, 2020	(\$5,000,000)
Trailing twelve (12) month period ending December 31, 2020	(\$7,000,000)

Actual:

A.	Net Income	\$
B.	To the extent included in the determination of Net Income	
	1.The provision for income taxes	\$
	2.Depreciation expense	\$
	3.Amortization expense	\$
	4.Net Interest Expense	\$
	5.Non-cash stock compensation expense	\$
	6.The sum of lines 1 through 5	\$
C.	EBITDA (line A plus line B.6)	

Is line C equal to or greater than \$_____?

No, not in compliance

Yes, in compliance

ASPEN AEROGELS, INC.

Common Stock
(par value \$0.00001 per share)

At Market Issuance Sales Agreement

November 5, 2020

B. Riley Securities, Inc.
299 Park Avenue
New York, NY 10171

Ladies and Gentlemen:

Aspen Aerogels, Inc., a Delaware corporation (the “Company”), confirms its agreement (this “Agreement”) with B. Riley Securities, Inc. (the “Agent”) as follows:

1. Issuance and Sale of Shares. The Company agrees that, from time to time during the term of this Agreement, on the terms and subject to the conditions set forth herein, it may issue and sell through the Agent, shares (the “Placement Shares”); of the Company’s common shares, par value \$0.00001 per share (the “Common Stock”); *provided however*, that in no event shall the Company issue or sell through the Agent such number of Placement Shares that (a) exceeds the number of shares or dollar amount of Common Stock registered on the effective Registration Statement (as defined below) pursuant to which the offering is being made or (b) exceeds the number of shares or dollar amount registered on the Prospectus Supplement (as defined below) (the lesser of (a) or (b) the “Maximum Amount”). Notwithstanding anything to the contrary contained herein, the parties hereto agree that compliance with the limitations set forth in this Section 1 on the number of Placement Shares issued and sold under this Agreement shall be the sole responsibility of the Company and that the Agent shall have no obligation in connection with such compliance. The issuance and sale of Placement Shares through the Agent will be effected pursuant to the Registration Statement (as defined below), although nothing in this Agreement shall be construed as requiring the Company to use the Registration Statement to issue any Placement Shares.

The Company has filed, in accordance with the provisions of the Securities Act of 1933, as amended and the rules and regulations thereunder (the “Securities Act”), with the Securities and Exchange Commission (the “Commission”), a registration statement on Form S-3, including a base prospectus relating to certain securities, including the Placement Shares, to be issued from time to time by the Company, and which incorporates by reference documents that the Company has filed or will file in accordance with the provisions of the Securities Exchange Act of 1934, as amended and the rules and regulations thereunder (the “Exchange Act”). The Company has prepared a prospectus supplement to the base prospectus included as part of such registration statement specifically relating to the Placement Shares (the “Prospectus Supplement”). The Company will furnish to the Agent, for use by the Agent, copies of the base prospectus included as part of such registration statement, as supplemented by the Prospectus Supplement, relating to the Placement Shares. Except where the context otherwise requires, such registration statement, and any post-effective amendment thereto, including all documents filed as part thereof or incorporated by reference therein, and including any information contained in a Prospectus (as defined below) subsequently filed with the Commission pursuant to Rule 424(b) under the Securities Act or deemed to be a part of such registration statement pursuant to Rule 430B of the Securities Act, is herein called the “Registration Statement.” The base prospectus, including all documents incorporated or deemed incorporated therein by reference to the extent such information has not been superseded or modified in accordance with Rule 412 under the Securities Act (as qualified by Rule 430B(g) of the Securities Act), included in the Registration Statement, as it may be supplemented by the Prospectus Supplement, in the form in which such base prospectus and/or Prospectus Supplement have most recently been filed by the Company with the Commission pursuant to Rule 424(b) under the Securities Act is herein called the “Prospectus.” Any reference herein to the Registration Statement, the Prospectus or any amendment or supplement thereto shall be deemed to refer to and include the documents incorporated by reference therein, and any reference herein to the terms “amend,” “amendment” or “supplement” with respect to the Registration Statement or the Prospectus shall be deemed to refer to and include the filing after the execution hereof of any document with the Commission incorporated by reference therein (the

“Incorporated Documents”).

For purposes of this Agreement, all references to the Registration Statement, the Prospectus or to any amendment or supplement thereto shall be deemed to include the most recent copy filed with the Commission pursuant to its Electronic Data Gathering Analysis and Retrieval System, or if applicable, the Interactive Data Electronic Application system when used by the Commission (collectively, “EDGAR”).

2. Placements. Each time that the Company wishes to issue and sell Placement Shares hereunder (each, a “Placement”), it will notify the Agent by electronic mail (or other method mutually agreed to in writing by the parties) of the number of Placement Shares, the time period during which sales are requested to be made, any limitation on the number of Placement Shares that may be sold in any one day and any minimum price below which sales may not be made (a “Placement Notice”), the form of which is attached hereto as Schedule 1. The Placement Notice shall originate from any of the individuals from the Company set forth on Schedule 3 (with a copy to each of the other individuals from the Company listed on such schedule), and shall be addressed to each of the individuals from the Agent set forth on Schedule 3, as such Schedule 3 may be amended from time to time. The Placement Notice shall be effective immediately upon receipt by the Agent unless and until (i) the Agent declines to accept the terms contained therein for any reason, in its sole discretion, (ii) the entire amount of the Placement Shares thereunder has been sold, (iii) the Company suspends or terminates the Placement Notice, which suspension and termination rights may be exercised by the Company in its sole discretion, or (iv) this Agreement has been terminated under the provisions of Section 13. The amount of any discount, commission or other compensation to be paid by the Company to the Agent in connection with the sale of the Placement Shares shall be calculated in accordance with the terms set forth in Schedule 2. It is expressly acknowledged and agreed that neither the Company nor the Agent will have any obligation whatsoever with respect to a Placement or any Placement Shares unless and until the Company delivers a Placement Notice to the Agent and the Agent does not decline such Placement Notice pursuant to the terms set forth above, and then only upon the terms specified therein and herein. In the event of a conflict between the terms of Sections 2 or 3 of this Agreement and the terms of a Placement Notice, the terms of the Placement Notice will control.

3. Sale of Placement Shares by the Agent. Subject to the terms and conditions of this Agreement, for the period specified in a Placement Notice, the Agent will use its commercially reasonable efforts consistent with its normal trading and sales practices and applicable state and federal laws, rules and regulations and the rules of the New York Stock Exchange (the “Exchange”), to sell the Placement Shares up to the amount specified in, and otherwise in accordance with the terms of, such Placement Notice. The Agent will provide written confirmation to the Company no later than the opening of the Trading Day (as defined below) immediately following the Trading Day on which it has made sales of Placement Shares hereunder setting forth the number of Placement Shares sold on such day, the compensation payable by the Company to the Agent pursuant to Section 2 with respect to such sales, and the Net Proceeds (as defined below) payable to the Company, with an itemization of the deductions made by the Agent (as set forth in Section 5(b)) from the gross proceeds that it receives from such sales. Subject to the terms of a Placement Notice, the Agent may sell Placement Shares by any method permitted by law deemed to be an “at the market offering” as defined in Rule 415 of the Securities Act. “Trading Day” means any day on which shares of Common Stock are purchased and sold on the Exchange.

4. Suspension of Sales. The Company or the Agent may, upon notice to the other party in writing (including by email correspondence to each of the individuals of the other party set forth on Schedule 3, if receipt of such correspondence is actually acknowledged by any of the individuals to whom the notice is sent, other than via auto-reply) or by telephone (confirmed immediately by verifiable facsimile transmission or email correspondence to each of the individuals of the other party set forth on Schedule 3), suspend any sale of Placement Shares (a “Suspension”), in which case the Agent shall use commercially reasonable efforts to immediately cease offering and selling such Placement Shares; *provided, however*, that such suspension shall not affect or impair any party’s obligations with respect to any Placement Shares sold hereunder prior to the receipt of such notice. While a Suspension is in effect, any obligation under Sections 7(l), 7(m), and 7(n) with respect to the delivery of certificates, opinions, or comfort letters to the Agent, shall be waived. Each of the parties agrees that no such notice under this Section 4 shall be effective against any other party unless it is made to one of the individuals named on Schedule 3 hereto, as such Schedule may be amended from time to time.

5. Sale and Delivery to the Agent; Settlement.

- a. Sale of Placement Shares. On the basis of the representations and warranties herein
-

contained and subject to the terms and conditions herein set forth, upon the Agent's acceptance of the terms of a Placement Notice, and unless the sale of the Placement Shares described therein has been declined, suspended, or otherwise terminated in accordance with the terms of this Agreement, the Agent, for the period specified in the Placement Notice, will use its commercially reasonable efforts consistent with its normal trading and sales practices and applicable state and federal laws, rules and regulations and the rules of the Exchange to sell such Placement Shares up to the amount specified in, and otherwise in accordance with the terms of, such Placement Notice. The Company acknowledges and agrees that (i) there can be no assurance that the Agent will be successful in selling Placement Shares, (ii) the Agent will incur no liability or obligation to the Company or any other person or entity if it does not sell Placement Shares for any reason other than a failure by the Agent to use its commercially reasonable efforts consistent with its normal trading and sales practices and applicable state and federal laws, rules and regulations and the rules of the Exchange to sell such Placement Shares as required under this Agreement and (iii) the Agent shall be under no obligation to purchase Placement Shares on a principal basis pursuant to this Agreement, except as otherwise agreed by the Agent and the Company.

b. Settlement of Placement Shares. Unless otherwise specified in the applicable Placement Notice, settlement for sales of Placement Shares will occur on the second (2nd) Trading Day (or such earlier day as is industry practice for regular-way trading) following the date on which such sales are made (each, a "Settlement Date"). The Agent shall notify the Company of each sale of Placement Shares no later than opening day following the Trading Day that the Agent sold Placement Shares. The amount of proceeds to be delivered to the Company on a Settlement Date against receipt of the Placement Shares sold (the "Net Proceeds") will be equal to the aggregate sales price received by the Agent, after deduction for (i) the Agent's commission, discount or other compensation for such sales payable by the Company pursuant to Section 2 hereof, and (ii) any transaction fees imposed by any governmental or self-regulatory organization in respect of such sales.

c. Delivery of Placement Shares. On or before each Settlement Date, the Company will, or will cause its transfer agent to, electronically transfer the Placement Shares being sold by crediting the Agent's or its designee's account (provided the Agent shall have given the Company written notice of such designee and such designee's account information at least one Trading Day prior to the Settlement Date) at The Depository Trust Company through its Deposit and Withdrawal at Custodian System or by such other means of delivery as may be mutually agreed upon by the parties hereto which in all cases shall be freely tradable, transferable, registered shares in good deliverable form. On each Settlement Date, the Agent will deliver the related Net Proceeds in same day funds to an account designated by the Company on, or prior to, the Settlement Date. The Company agrees that if the Company, or its transfer agent (if applicable), defaults in its obligation to deliver Placement Shares on a Settlement Date through no fault of the Agent, then in addition to and in no way limiting the rights and obligations set forth in Section 11(a) hereto, it will (i) hold the Agent harmless against any loss, claim, damage, or reasonable, documented expense (including reasonable and documented legal fees and expenses), as incurred, arising out of or in connection with such default by the Company or its transfer agent (if applicable) and (ii) pay to the Agent (without duplication) any commission, discount, or other compensation to which it would otherwise have been entitled absent such default.

d. Limitations on Offering Size. Under no circumstances shall the Company cause or request the offer or sale of any Placement Shares if, after giving effect to the sale of such Placement Shares, the aggregate number of Placement Shares sold pursuant to this Agreement would exceed the lesser of (A) together with all sales of Placement Shares under this Agreement, the Maximum Amount, (B) the amount available for offer and sale under the currently effective Registration Statement and (C) the amount authorized from time to time to be issued and sold under this Agreement by the Company's board of directors, a duly authorized committee thereof or a duly authorized executive committee, and notified to the Agent in writing. Under no circumstances shall the Company cause or request the offer or sale of any Placement Shares pursuant to this Agreement at a price lower than the minimum price authorized from time to time by the Company's board of directors, a duly authorized committee thereof or a duly authorized executive committee, and notified to the Agent in writing.

6. Representations and Warranties of the Company. Except as disclosed in the Registration Statement or Prospectus (including the Incorporated Documents), the Company represents and warrants to, and agrees with the Agent that as of the date of this Agreement and as of each Applicable Time (as defined below), unless such representation, warranty or agreement specifies a different date or time:

a. Registration Statement and Prospectus. The transactions contemplated by this Agreement meet the requirements for and comply with the conditions for the use of Form S-3 under the Securities Act. The

Registration Statement has been filed with the Commission and has been declared effective under the Securities Act. The Prospectus Supplement will name the Agent as the agent in the section entitled “Plan of Distribution.” The Company has not received, and has no notice of, any order of the Commission preventing or suspending the use of the Registration Statement, or threatening or instituting proceedings for that purpose. The Registration Statement and the offer and sale of Placement Shares as contemplated hereby meet the requirements of Rule 415 under the Securities Act and comply in all material respects with said Rule. Any statutes, regulations, contracts or other documents that are required to be described in the Registration Statement or the Prospectus or to be filed as exhibits to the Registration Statement have been so described or filed, as applicable. Copies of the Registration Statement, the Prospectus, and any such amendments or supplements and all documents incorporated by reference therein that were filed with the Commission on or prior to the date of this Agreement have been delivered, or are available through EDGAR, to the Agent and its counsel. The Company has not distributed and, prior to the later to occur of each Settlement Date and completion of the distribution of the Placement Shares, will not distribute any offering material in connection with the offering or sale of the Placement Shares other than the Registration Statement and the Prospectus and any Issuer Free Writing Prospectus (as defined below) relating to the Placement Shares to which the Agent has consented, which consent will not be unreasonably withheld or delayed, or that is required by applicable law or the listing maintenance requirements of the Exchange. The Common Stock is currently quoted on the Exchange under the trading symbol “ASPN.” The Company has not, in the 12 months preceding the date hereof, received notice from the Exchange to the effect that the Company is not in compliance with the listing or maintenance requirements of the Exchange. To the Company’s knowledge, it is in compliance with all such listing and maintenance requirements.

b. No Misstatement or Omission. At each Settlement Date, the Registration Statement and the Prospectus, as of such date, will conform in all material respects with the requirements of the Securities Act. The Registration Statement, when it became or becomes effective, did not and will not contain an untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein not misleading. The Prospectus and any amendment and supplement thereto, on the date thereof and at each Applicable Time (defined below), did not or will not include an untrue statement of a material fact or omit to state a material fact necessary to make the statements therein, in light of the circumstances under which they were made, not misleading. The documents incorporated by reference in the Prospectus or any Prospectus Supplement did not, and any further documents filed and incorporated by reference therein will not, when filed with the Commission, contain an untrue statement of a material fact or omit to state a material fact required to be stated in such document or necessary to make the statements in such document, in light of the circumstances under which they were made, not misleading. The foregoing shall not apply to statements in, or omissions from, any such document made in reliance upon, and in conformity with, information furnished to the Company by the Agent specifically for use in the preparation thereof.

c. Conformity with Securities Act and Exchange Act. The Registration Statement, the Prospectus, any Issuer Free Writing Prospectus or any amendment or supplement thereto, and the Incorporated Documents, when such documents were or are filed with the Commission under the Securities Act or the Exchange Act or became or become effective under the Securities Act, as the case may be, conformed or will conform in all material respects with the requirements of the Securities Act and the Exchange Act, as applicable.

d. Financial Information. The consolidated financial statements of the Company included or incorporated by reference in the Registration Statement and the Prospectus, together with the related notes and schedules, present fairly, in all material respects, the consolidated financial position of the Company and the Subsidiaries (as defined below) as of the dates indicated and the consolidated results of operations, cash flows and changes in stockholders’ equity of the Company and the Subsidiaries for the periods specified (subject, in the case of unaudited statements, to normal year-end audit adjustments which will not be material, either individually or in the aggregate) and have been prepared in compliance with the published requirements of the Securities Act and Exchange Act, as applicable and as in effect at the time of filing, and in conformity with generally accepted accounting principles in the United States (“GAAP”) as in effect at the time of filing applied on a consistent basis (except (i) for such adjustments to accounting standards and practices as are noted therein and (ii) in the case of unaudited interim statements, to the extent they may exclude footnotes or may be condensed or summary statements) during the periods involved; the other financial and statistical data with respect to the Company and the Subsidiaries contained or incorporated by reference in the Registration Statement and the Prospectus, are accurately and fairly presented in all material respects and prepared on a basis consistent with the financial statements and books and records of the Company; there are no financial statements (historical or pro forma) that are required to be

included or incorporated by reference in the Registration Statement, or the Prospectus that are not included or incorporated by reference as required; the Company and the Subsidiaries do not have any material liabilities or obligations, direct or contingent (including any off balance sheet obligations), not described in the Registration Statement, and the Prospectus which are required to be described in the Registration Statement or Prospectus; and all disclosures contained or incorporated by reference in the Registration Statement and the Prospectus, if any, regarding “non-GAAP financial measures” (as such term is defined by the rules and regulations of the Commission) comply in all material respects with Regulation G of the Exchange Act and Item 10 of Regulation S-K under the Securities Act, to the extent applicable.

e. Conformity with EDGAR Filing. The Prospectus delivered to the Agent for use in connection with the sale of the Placement Shares pursuant to this Agreement will be identical to the versions of the Prospectus created to be transmitted to the Commission for filing via EDGAR, except to the extent permitted by Regulation S-T.

f. Organization. The Company and any subsidiary that is a significant subsidiary (as such term is defined in Rule 1-02 of Regulation S-X promulgated by the Commission) (each, a “Subsidiary,” collectively, the “Subsidiaries”), are, and will be, duly organized, validly existing as a corporation and in good standing under the laws of their respective jurisdictions of organization. The Company and the Subsidiaries are duly licensed or qualified as a foreign corporation to do business and are in good standing under the laws of each other jurisdiction in which their respective ownership or lease of property or the conduct of their respective businesses requires such license or qualification, and have all corporate power and authority necessary to own or hold their respective properties and to conduct their respective businesses as described in the Registration Statement and the Prospectus, except, in each case, where the failure to be so qualified or in good standing or have such power or authority would not, individually or in the aggregate, be reasonably likely to have a material adverse effect on the assets, business, operations, earnings, properties, condition (financial or otherwise), prospects, stockholders’ equity or results of operations of the Company and the Subsidiaries taken as a whole, or prevent the consummation of the transactions contemplated hereby (a “Material Adverse Effect”).

g. Subsidiaries. As of the date hereof, the Company’s only Subsidiaries are set forth on Schedule 6(g). The Company owns directly or indirectly, all of the equity interests of the Subsidiaries free and clear of any lien, charge, security interest, encumbrance, right of first refusal or other restriction, and all the equity interests of the Subsidiaries are validly issued and are fully paid, nonassessable and free of preemptive and similar rights.

h. No Violation or Default. Neither the Company nor any Subsidiary is (i) in violation of its charter or by-laws or similar organizational documents; (ii) in default, and no event has occurred that, with notice or lapse of time or both, would constitute such a default, in the due performance or observance of any term, covenant or condition contained in any indenture, mortgage, deed of trust, loan agreement or other similar material agreement or instrument to which the Company or any Subsidiary is a party or by which the Company or any Subsidiary is bound or to which any of the property or assets of the Company or any Subsidiary is subject; or (iii) in violation of any law or statute or any judgment, order, decree, rule or regulation of any court or arbitrator or governmental or regulatory authority, except, in the case of each of clauses (ii) and (iii) above, for any such violation or default that would not, individually or in the aggregate, have a Material Adverse Effect. To the Company’s knowledge, no other party under any material contract or other material agreement to which it or any Subsidiary is a party is in default in any respect thereunder where such default would have a Material Adverse Effect.

i. No Material Adverse Effect. Since the date of the most recent financial statements of the Company included or incorporated by reference in the Registration Statement and Prospectus, there has not been (i) any Material Adverse Effect, or any development that would result in a Material Adverse Effect, (ii) any transaction which is material to the Company and the Subsidiaries taken as a whole, (iii) any obligation or liability, direct or contingent (including any off-balance sheet obligations), incurred by the Company or the Subsidiaries, which is material to the Company and the Subsidiaries taken as a whole, (iv) any material change in the capital stock (other than (A) the grant of additional options under the Company’s existing stock option plans, (B) changes in the number of outstanding Common Stock of the Company due to the issuance of shares upon the exercise or conversion of securities exercisable for, or convertible into, Common Stock outstanding on the date hereof, (C) as a result of the issuance of Placement Shares, (D) any repurchases of capital stock of the Company, (E) as described in a proxy statement filed on Schedule 14A or a Registration Statement on Form S-4, or (F) otherwise publicly announced) or outstanding long-term indebtedness of the Company or the Subsidiaries or (v) any dividend or distribution of any

kind declared, paid or made on the capital stock of the Company or any Subsidiary, other than in each case above in the ordinary course of business or as otherwise disclosed in the Registration Statement or Prospectus (including any document incorporated by reference therein).

j. Capitalization. The issued and outstanding shares of capital stock of the Company have been validly issued, are fully paid and non-assessable and, other than as disclosed in the Registration Statement or the Prospectus, are not subject to any preemptive rights, rights of first refusal or similar rights. The Company has an authorized, issued and outstanding capitalization as set forth in the Registration Statement and the Prospectus as of the dates referred to therein (other than (i) the grant of additional options, shares and other equity incentives under the Company's existing equity incentive plans, (ii) changes in the number of outstanding Common Stock of the Company due to the issuance of shares upon the exercise, conversion or vesting of securities exercisable for, convertible into or vesting into Common Stock outstanding on the date hereof or issued thereafter pursuant to clause (i) above, (iii) as a result of the issuance of Placement Shares, or (iv) any repurchases of capital stock of the Company) and such authorized capital stock conforms in all material respects to the description thereof set forth in the Registration Statement and the Prospectus. The description of the Common Stock in the Registration Statement and the Prospectus is complete and accurate in all material respects. Except as disclosed in or contemplated by the Registration Statement or the Prospectus, the Company did not have outstanding any options to purchase, or any rights or warrants to subscribe for, or any securities or obligations convertible into, or exchangeable for, or any contracts or commitments to issue or sell, any shares of capital stock or other securities.

k. S-3 Eligibility. At the time the Registration Statement was or will be declared effective, and at the time the Company's most recent Annual Report on Form 10-K was filed with the Commission, the Company met or will meet the then applicable requirements for the use of Form S-3 under the Securities Act, including, but not limited to, General Instruction I.B.6 of Form S-3, if applicable. As of the close of trading on the Exchange on September 30, 2020, the aggregate market value of the outstanding voting and non-voting common equity (as defined in Rule 405) of the Company held by persons other than affiliates of the Company (pursuant to Rule 144 of the Securities Act, those that directly, or indirectly through one or more intermediaries, control, or are controlled by, or are under common control with, the Company) (the "Non-Affiliate Shares"), was approximately \$282.3 million (calculated by multiplying (x) the price at which the common equity of the Company was last sold on the Exchange on September 30, 2020 times (y) the number of Non-Affiliate Shares). The Company is not a shell company (as defined in Rule 405 under the Securities Act) and has not been a shell company for at least 12 calendar months previously and if it has been a shell company at any time previously, has filed current Form 10 information (as defined in General Instruction I.B.6 of Form S-3) with the Commission at least 12 calendar months previously reflecting its status as an entity that is not a shell company.

l. Authorization; Enforceability. The Company has full legal right, power and authority to enter into this Agreement and perform the transactions contemplated hereby. This Agreement has been duly authorized, executed and delivered by the Company and is a legal, valid and binding agreement of the Company enforceable against the Company in accordance with its terms, except to the extent that (i) enforceability may be limited by bankruptcy, insolvency, reorganization, moratorium or similar laws affecting creditors' rights generally and by general equitable principles and (ii) the indemnification and contribution provisions of Section 11 hereof may be limited by federal or state securities laws and public policy considerations in respect thereof.

m. Authorization of Placement Shares. The Placement Shares, when issued and delivered pursuant to the terms approved by the board of directors of the Company or a duly authorized committee thereof, or a duly authorized executive committee, against payment therefor as provided herein, will be duly and validly authorized and issued and fully paid and nonassessable, free and clear of any pledge, lien, encumbrance, security interest or other claim (other than any pledge, lien, encumbrance, security interest or other claim arising from an act or omission of the Agent or a purchaser), including any statutory or contractual preemptive rights, resale rights, rights of first refusal or other similar rights, and will be registered pursuant to Section 12 of the Exchange Act. The Placement Shares, when issued, will conform in all material respects to the description thereof set forth in or incorporated into the Prospectus.

n. No Consents Required. No consent, approval, authorization, order, permit, certification, registration or qualification of or with any court or arbitrator or any governmental or regulatory authority having jurisdiction over the Company is required for the execution, delivery and performance by the Company of this Agreement, and the issuance and sale by the Company of the Placement Shares as contemplated hereby, except for such consents, approvals, authorizations, orders and registrations or qualifications (i) as may be required under

applicable state securities laws or by the by-laws and rules of the Financial Industry Regulatory Authority (“FINRA”) or the Exchange, including any notices that may be required by the Exchange, in connection with the sale of the Placement Shares by the Agent and (ii) as have been previously obtained by the Company.

o. No Preferential Rights. (i) No person, as such term is defined in Rule 1-02 of Regulation S-X promulgated under the Securities Act (each, a “Person”), has the right, contractual or otherwise, to cause the Company to issue or sell to such Person any Common Stock or shares of any other capital stock or other securities of the Company (other than upon the exercise of options or warrants to purchase Common Stock or upon the exercise of options that may be granted from time to time under the Company’s stock option plan), (ii) no Person has any preemptive rights, rights of first refusal, or any other rights (whether pursuant to a “poison pill” provision or otherwise) to purchase any Common Stock or shares of any other capital stock or other securities of the Company from the Company which have not been duly waived with respect to the offering contemplated hereby, (iii) no Person has the right to act as an underwriter, agent or as a financial advisor to the Company in connection with the offer and sale of the Common Stock, and (iv) no Person has the right, contractual or otherwise, to require the Company to register under the Securities Act any Common Stock or shares of any other capital stock or other securities of the Company, or to include any such shares or other securities in the Registration Statement or the offering contemplated thereby, whether as a result of the filing or effectiveness of the Registration Statement or the sale of the Placement Shares as contemplated thereby or otherwise, except in each case for such rights as have been waived on or prior to the date hereof.

p. Independent Public Accountant. KPMG LLP (the “Accountant”), whose report on the consolidated financial statements of the Company is filed with the Commission as part of the Company’s most recent Annual Report on Form 10-K filed with the Commission and incorporated into the Registration Statement, are and, during the periods covered by their report, were independent public accountants within the meaning of the Securities Act and the Public Company Accounting Oversight Board (United States). To the Company’s knowledge, the Accountant is not in violation of the auditor independence requirements of the Sarbanes-Oxley Act of 2002 (the “Sarbanes-Oxley Act”) with respect to the Company.

q. Enforceability of Agreements. All agreements between the Company and third parties expressly referenced in the Registration Statement or the Prospectus, other than such agreements that have expired by their terms or whose termination is disclosed in documents filed by the Company on EDGAR, are legal, valid and binding obligations of the Company and, to the Company’s knowledge, enforceable in accordance with their respective terms, except to the extent that (i) enforceability may be limited by bankruptcy, insolvency, reorganization, moratorium or similar laws affecting creditors’ rights generally and by general equitable principles and (ii) the indemnification provisions of certain agreements may be limited by federal or state securities laws or public policy considerations in respect thereof, and except for any unenforceability that, individually or in the aggregate, would not have a Material Adverse Effect.

r. No Litigation. Except as disclosed in the Registration Statement and the Prospectus, there are no legal or governmental proceedings pending or threatened to which the Company or any Subsidiary is a party or to which any of the properties of the Company or any Subsidiary is subject (i) other than proceedings that would not, if determined adversely to the Company or any Subsidiary, have a Material Adverse Effect on the Company and its subsidiaries, taken as a whole, or on the power or ability of the Company to perform its obligations under this Agreement or to consummate the transactions contemplated by the Prospectus or (ii) that are required to be described in the Registration Statement or the Prospectus and are not so described; and there are no statutes, regulations, contracts or other documents that are required to be described in the Registration Statement or the Prospectus or to be filed as exhibits to the Registration Statement that are not described or filed as required.

s. Licenses and Permits. The Company and the Subsidiaries possess or have obtained, all licenses, certificates, consents, orders, approvals, permits, registrations, qualifications and other authorizations issued by, and have made all declarations and filings with, the appropriate federal, state, local or foreign governmental or regulatory authorities that are necessary for the ownership or lease of their respective properties or the conduct of their respective businesses as currently conducted, as described in the Registration Statement and the Prospectus (the “Permits”), except where the failure to possess, obtain or make the same would not, individually or in the aggregate, have a Material Adverse Effect. Neither the Company nor any Subsidiary has received written notice of any proceeding relating to revocation or modification of any such Permit, except where the failure to obtain any such renewal would not, individually or in the aggregate, have a Material Adverse Effect.

t. No Material Defaults. Neither the Company nor any Subsidiary has defaulted on any installment on indebtedness for borrowed money or on any rental on one or more long-term leases, which defaults, individually or in the aggregate, would have a Material Adverse Effect. The Company has not filed a report pursuant to Section 13(a) or 15(d) of the Exchange Act since the filing of its last Annual Report on Form 10-K, indicating that it (i) has failed to pay any dividend or sinking fund installment on preferred stock or (ii) has defaulted on any installment on indebtedness for borrowed money or on any rental on one or more long-term leases, which defaults, individually or in the aggregate, would have a Material Adverse Effect.

u. Certain Market Activities. Neither the Company, nor any Subsidiary, nor, to the knowledge of the Company, any of their respective directors, officers or controlling persons has taken, directly or indirectly, any action designed, or that has constituted or would cause or result in, under the Exchange Act or otherwise, the stabilization or manipulation of the price of any security of the Company to facilitate the sale or resale of the Placement Shares.

v. Broker/Dealer Relationships. Neither the Company nor any Subsidiary or any related entities (i) is required to register as a “broker” or “dealer” in accordance with the provisions of the Exchange Act or (ii) directly or indirectly through one or more intermediaries, controls or is a “person associated with a member” or “associated person of a member” (within the meaning set forth in the FINRA Manual).

w. No Reliance. The Company has not relied upon the Agent or legal counsel for the Agent for any legal, tax or accounting advice in connection with the offering and sale of the Placement Shares.

x. Taxes. The Company and the Subsidiaries have filed all federal, state, local and foreign tax returns which have been required to be filed and paid all taxes shown thereon through the date hereof, to the extent that such taxes have become due and are not being contested in good faith, except where the failure to do so would not have a Material Adverse Effect. Except as otherwise disclosed in or contemplated by the Registration Statement or the Prospectus, no tax deficiency has been determined adversely to the Company or any Subsidiary which has had, or have, individually or in the aggregate, a Material Adverse Effect. The Company has no knowledge of any federal, state or other governmental tax deficiency, penalty or assessment which has been or might be asserted or threatened against it which have a Material Adverse Effect.

y. Title to Real and Personal Property. Except as disclosed in the Registration Statement and the Prospectus, the Company and the Subsidiaries have good and valid title in fee simple to all items of real property and good and valid title to all personal property described in the Registration Statement or Prospectus as being owned by them that are material to the businesses of the Company or such Subsidiary, in each case free and clear of all liens, encumbrances and claims, except those that (i) do not materially interfere with the use made and proposed to be made of such property by the Company and the Subsidiaries or (ii) would not, individually or in the aggregate, have a Material Adverse Effect. Any real property described in the Registration Statement or Prospectus as being leased by the Company and the Subsidiaries is held by them under valid, existing and enforceable leases, except those that (A) do not materially interfere with the use made or proposed to be made of such property by the Company or the Subsidiaries or (B) would not, individually or in the aggregate, have a Material Adverse Effect.

z. Intellectual Property. The Company and the Subsidiary own or possess adequate and valid right to use all patents, patent applications, trademarks (both registered and unregistered), trade names, trademark registrations, service marks, service mark registrations, Internet domain name registrations, copyrights, copyright registrations, licenses and know-how (including trade secrets and other unpatented and/or unpatentable proprietary or confidential information, systems or procedures) (collectively, the “Intellectual Property”), necessary for the conduct of their respective businesses as conducted as of the date hereof, except to the extent that the failure to own or possess adequate rights to use such Intellectual Property would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect. Except as disclosed in the Registration Statement and the Prospectus, the Company and the Subsidiaries have not received any written notice of any claim of infringement which asserted Intellectual Property rights of others, which infringement, if the subject of an unfavorable decision, would result in a Material Adverse Effect. Except as disclosed in the Registration Statement and the Prospectus, there are no pending, or to the Company’s knowledge, threatened judicial proceedings or interference proceedings challenging the Company’s or any Subsidiary’s rights in or to or the validity of the scope of any of the Company’s or its Subsidiaries’ patents, patent applications, trademarks, other intellectual property or proprietary information, which proceedings, if decided adversely for the Company or its Subsidiaries, would result in a Material Adverse Effect. Except as disclosed in the Registration Statement and the Prospectus, no other entity or individual has any right or claim in any of the Company’s or any of its Subsidiary’s patents, patent applications

or any patent to be issued therefrom by virtue of any contract, license or other agreement entered into between such entity or individual and the Company or any Subsidiary or by any non-contractual obligation, other than by written licenses granted by the Company or any Subsidiary. Except as disclosed in the Registration Statement and the Prospectus, the Company has not received any written notice of any claim challenging the rights of the Company or its Subsidiaries in or to any Intellectual Property owned, licensed or optioned by the Company or any Subsidiary which claim, if the subject of an unfavorable decision, would result in a Material Adverse Effect.

aa. Compliance with Applicable Laws. The Company has not been advised, and has no reason to believe, that it and each of its Subsidiaries are not conducting business in compliance with all applicable laws, rules and regulations of the jurisdictions in which it is conducting business, except where failure to be so in compliance would not result in a Material Adverse Effect.

bb. Environmental Laws. Except as disclosed in the Registration Statement and the Prospectus, the Company and the Subsidiaries (i) are in compliance with any and all applicable federal, state, local and foreign laws, rules, regulations, decisions and orders relating to the protection of human health and safety, the environment or hazardous or toxic substances or wastes, pollutants or contaminants (collectively, “Environmental Laws”); (ii) have received and are in compliance with all permits, licenses or other approvals required of them under applicable Environmental Laws to conduct their respective businesses as described in the Registration Statement and the Prospectus; and (iii) have not received notice of any actual or potential liability for the investigation or remediation of any disposal or release of hazardous or toxic substances or wastes, pollutants or contaminants, except, in the case of any of clauses (i), (ii) or (iii) above, for any such failure to comply or failure to receive required permits, licenses, other approvals or liability as would not, individually or in the aggregate, have a Material Adverse Effect.

cc. Disclosure Controls. The Company maintains a system of internal accounting controls sufficient to provide reasonable assurance that (i) transactions are executed in accordance with management’s general or specific authorizations; (ii) transactions are recorded as necessary to permit preparation of financial statements in conformity with GAAP and to maintain asset accountability; (iii) access to assets is permitted only in accordance with management’s general or specific authorization; and (iv) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action is taken with respect to any differences. The Company is not aware of any material weaknesses in its internal control over financial reporting (other than as set forth in the Registration Statement or the Prospectus). Since the date of the latest audited financial statements of the Company included in the Prospectus, there has been no change in the Company’s internal control over financial reporting that has materially affected, or is reasonably likely to materially affect, the Company’s internal control over financial reporting (other than as set forth in the Registration Statement or the Prospectus). The Company has established disclosure controls and procedures (as defined in Exchange Act Rules 13a-15 and 15d-15) that comply with the requirements of the Exchange Act. The Company’s certifying officers have evaluated the effectiveness of the Company’s controls and procedures as of a date within 90 days prior to the filing date of the Form 10-K for the fiscal year most recently ended (such date, the “Evaluation Date”). The Company presented in its Form 10-K for the fiscal year most recently ended the conclusions of the certifying officers about the effectiveness of the disclosure controls and procedures based on their evaluations as of the most recent Evaluation Date, and the “disclosure controls and procedures” are effective.

dd. Sarbanes-Oxley Act. There is and has been no failure on the part of the Company or, to the knowledge of the Company, any of the Company’s directors or officers, in their capacities as such, to comply in all material respects with any applicable provisions of the Sarbanes-Oxley Act and the rules and regulations promulgated thereunder. Each of the principal executive officer and the principal financial officer of the Company (or each former principal executive officer of the Company and each former principal financial officer of the Company as applicable) has made all certifications required by Sections 302 and 906 of the Sarbanes-Oxley Act with respect to all reports, schedules, forms, statements and other documents required to be filed by it or furnished by it to the Commission during the past 12 months. For purposes of the preceding sentence, “principal executive officer” and “principal financial officer” shall have the meanings given to such terms in the Exchange Act Rules 13a-15 and 15d-15.

ee. Finder’s Fees. Neither the Company nor any Subsidiary has incurred any liability for any finder’s fees, agency or brokerage commissions or similar payments in connection with the transactions herein contemplated, except as may otherwise exist with respect to the Agent pursuant to this Agreement.

ff. Labor Disputes. No labor dispute exists or, to the knowledge of the Company, is

imminent with respect to any of the employees of the Company, which could reasonably be expected to result in a Material Adverse Effect. None of the Company's or its Subsidiaries' employees is a member of a union that relates to such employee's relationship with the Company or such Subsidiary, and neither the Company nor any of its Subsidiaries is a party to a collective bargaining agreement, and the Company and its Subsidiaries believe that their relationships with their employees are good. To the knowledge of the Company, no executive officer of the Company or any Subsidiary, is, or is now expected to be, in violation of any material term of any employment contract, confidentiality, disclosure or proprietary information agreement or non-competition agreement, or any other contract or agreement or any restrictive covenant in favor of any third party, and the continued employment of each such executive officer does not subject the Company or any of its Subsidiaries to any liability with respect to any of the foregoing matters. The Company and its Subsidiaries are in compliance with all U.S. federal, state, local and foreign laws and regulations relating to employment and employment practices, terms and conditions of employment and wages and hours, except where the failure to be in compliance could not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect.

gg. Investment Company Act. Neither the Company nor any Subsidiary is or, after giving effect to the offering and sale of the Placement Shares, will be required to register as an "investment company" or an entity "controlled" by an "investment company," as such terms are defined in the Investment Company Act of 1940, as amended (the "Investment Company Act").

hh. No Prohibition on Dividends or Distributions. Except as disclosed in the Registration Statement and the Prospectus, none of the Subsidiaries is currently prohibited, directly or indirectly, under any agreement or other instrument to which it is a party or is subject, from paying any dividends to the Company, from making any other distribution on such Subsidiary's capital stock, from repaying to the Company any loans or advances to such Subsidiary from the Company or from transferring any of such Subsidiary's properties or assets to the Company or any other Subsidiary of the Company;

ii. Operations. The operations of the Company and the Subsidiaries are and have been conducted at all times in compliance with applicable financial record keeping and reporting requirements of the Currency and Foreign Transactions Reporting Act of 1970, as amended, the money laundering statutes of all jurisdictions to which the Company or the Subsidiaries are subject, the rules and regulations thereunder and any related or similar rules, regulations or guidelines, issued, administered or enforced by any governmental agency having jurisdiction over the Company (collectively, the "Money Laundering Laws"), except where the failure to be in such compliance would not result in a Material Adverse Effect; and no action, suit or proceeding by or before any court or governmental agency, authority or body or any arbitrator involving the Company or any Subsidiary with respect to the Money Laundering Laws is pending or, to the knowledge of the Company, threatened.

jj. Off-Balance Sheet Arrangements. There are no transactions, arrangements and other relationships between and/or among the Company, and/or, to the knowledge of the Company, any of its affiliates and any unconsolidated entity, including, but not limited to, any structured finance, special purpose or limited purpose entity (each, an "Off Balance Sheet Transaction") that would affect materially the Company's liquidity or the availability of or requirements for its capital resources, including those Off Balance Sheet Transactions described in the Commission's Statement about Management's Discussion and Analysis of Financial Conditions and Results of Operations (Release Nos. 33-8056; 34-45321; FR-61), required to be described in the Registration Statement or the Prospectus which have not been described as required.

kk. Underwriter Agreements. The Company is not a party to any agreement with an agent or underwriter for any other "at the market" or continuous equity transaction. No third party has a preferential right, right of first refusal, right of first offer or other right to act as agent or broker in connection with, or otherwise participate in, the sale of the Placement Shares.

ll. ERISA. To the knowledge of the Company, (i) each material employee benefit plan, within the meaning of Section 3(3) of the Employee Retirement Income Security Act of 1974, as amended ("ERISA") that is maintained, administered or contributed to by the Company or any of its affiliates for employees or former employees of the Company and the Subsidiaries has been maintained in material compliance with its terms and the requirements of any applicable statutes, orders, rules and regulations, including but not limited to ERISA and the Internal Revenue Code of 1986, as amended (the "Code"); (ii) no prohibited transaction, within the meaning of Section 406 of ERISA or Section 4975 of the Code, has occurred which would result in a material liability to the Company with respect to any such plan excluding transactions effected pursuant to a statutory or administrative exemption; and (iii) for each such plan that is subject to the funding rules of Section 412 of the Code

or Section 302 of ERISA, no “accumulated funding deficiency” as defined in Section 412 of the Code has been incurred, whether or not waived, and the fair market value of the assets of each such plan (excluding for these purposes accrued but unpaid contributions) equals or exceeds the present value of all benefits accrued under such plan determined using reasonable actuarial assumptions, other than, in the case of (i), (ii) and (iii) above, as would not have a Material Adverse Effect.

mm. Forward-Looking Statements. No forward-looking statement (within the meaning of Section 27A of the Securities Act and Section 21E of the Exchange Act) (a “Forward-Looking Statement”) contained in the Registration Statement and the Prospectus has been made or reaffirmed without a reasonable basis or has been disclosed other than in good faith.

nn. Statistical and Market-Related Data. All statistical and market related data included in the Registration Statement and the Prospectus are based on or derived from sources that the Company believes, after reasonable inquiry, to be reliable and accurate, and such data agree with the sources from which they are derived, and, to the extent required, the Company has obtained the written consent to the use of such data from such sources.

oo. Margin Rules. Neither the issuance, sale and delivery of the Placement Shares nor the application of the proceeds thereof by the Company as described in the Registration Statement and the Prospectus will violate Regulation T, U or X of the Board of Governors of the Federal Reserve System.

pp. Insurance. The Company and the Subsidiaries carry, or are covered by, insurance with financially sound and reputable insurers in such amounts and covering such risks as the Company and the Subsidiaries reasonably believe are adequate for the conduct of their business.

qq. No Improper Practices. (i) Neither the Company nor, to the Company’s knowledge, the Subsidiaries, nor to the Company’s knowledge, any of their respective executive officers has, in the past five years, made any unlawful contributions to any candidate for any political office (or failed fully to disclose any contribution in violation of law) or made any contribution or other payment to any official of, or candidate for, any federal, state, municipal, or foreign office or other person charged with similar public or quasi-public duty in violation of any law or of the character required to be disclosed in the Prospectus; (ii) no relationship, direct or indirect, exists between or among the Company or, to the Company’s knowledge, the Subsidiaries or any affiliate of any of them, on the one hand, and the directors, officers and stockholders of the Company or, to the Company’s knowledge, the Subsidiaries, on the other hand, that is required by the Securities Act to be described in the Registration Statement and the Prospectus that is not so described; (iii) no relationship, direct or indirect, exists between or among the Company or the Subsidiaries or any affiliate of them, on the one hand, and the directors, officers, stockholders or directors of the Company or, to the Company’s knowledge, the Subsidiaries, on the other hand, that is required by the rules of FINRA to be described in the Registration Statement and the Prospectus that is not so described; (iv) there are no material outstanding loans or advances or material guarantees of indebtedness by the Company or, to the Company’s knowledge, the Subsidiaries to or for the benefit of any of their respective officers or directors or any of the members of the families of any of them; and (v) the Company has not offered, or caused any placement agent to offer, Common Stock to any person with the intent to influence unlawfully (A) a customer or supplier of the Company or the Subsidiaries to alter the customer’s or supplier’s level or type of business with the Company or the Subsidiaries or (B) a trade journalist or publication to write or publish favorable information about the Company or the Subsidiaries or any of their respective products or services, and, (vi) neither the Company nor the Subsidiaries nor, to the Company’s knowledge, any employee or agent of the Company or the Subsidiaries has made any payment of funds of the Company or the Subsidiaries or received or retained any funds in violation of any law, rule or regulation (including, without limitation, the Foreign Corrupt Practices Act of 1977), which payment, receipt or retention of funds is of a character required to be disclosed in the Registration Statement or the Prospectus.

rr. Status Under the Securities Act. The Company was not and is not an ineligible issuer as defined in Rule 405 under the Securities Act at the times specified in Rules 164 and 433 under the Securities Act in connection with the offering of the Placement Shares.

ss. No Misstatement or Omission in an Issuer Free Writing Prospectus. Each Issuer Free Writing Prospectus, as of its issue date and as of each Applicable Time (as defined in Section 25 below), did not, does not and will not, through the completion of the Placement or Placements for which such Issuer Free Writing Prospectus is issued, include any information that conflicted, conflicts or will conflict with the information contained in the Registration Statement or the Prospectus, including any incorporated document deemed to be a part thereof that has not been superseded or modified. The foregoing sentence does not apply to statements in or

omissions from any Issuer Free Writing Prospectus based upon and in conformity with written information furnished to the Company by the Agent specifically for use therein.

tt. No Conflicts. Neither the execution of this Agreement, nor the issuance, offering or sale of the Placement Shares, nor the consummation of any of the transactions contemplated herein and therein, nor the compliance by the Company with the terms and provisions hereof and thereof will conflict with, or will result in a breach of, any of the terms and provisions of, or has constituted or will constitute a default under, or has resulted in or will result in the creation or imposition of any lien, charge or encumbrance upon any property or assets of the Company pursuant to the terms of any contract or other agreement or understanding to which the Company may be bound or to which any of the property or assets of the Company is subject, except (i) such conflicts, breaches or defaults as may have been waived and (ii) such conflicts, breaches and defaults that would not have a Material Adverse Effect or interfere with the Company's ability to perform its obligations under this Agreement or to consummate the transactions contemplated by the Prospectus; nor will such action result (x) in any violation of the provisions of the organizational or governing documents of the Company, or (y) in any material violation of the provisions of any statute or any order, rule or regulation applicable to the Company or of any court or of any federal, state or other regulatory authority or other government body having jurisdiction over the Company, except where such violation would not have a Material Adverse Effect.

uu. OFAC.

(i) Neither the Company nor any Subsidiary (collectively, the "Entity") nor, to the Company's knowledge, any director, officer, employee, agent, affiliate or representative of the Entity, is a government, individual, or entity (in this paragraph (ss), "Person") that is, or is owned or controlled by a Person that is:

(a) the subject of any sanctions administered or enforced by the U.S. Department of Treasury's Office of Foreign Assets Control ("OFAC"), the United Nations Security Council ("UNSC"), the European Union ("EU"), Her Majesty's Treasury ("HMT"), or other relevant sanctions authority (collectively, "Sanctions"), nor

(b) located, organized or resident in a country or territory that is the subject of Sanctions.

(ii) The Entity will not, directly or indirectly, knowingly use the proceeds of the offering, or lend, contribute or otherwise make available such proceeds to any subsidiary, joint venture partner or other Person:

(a) to fund or facilitate any activities or business of or with any Person or in any country or territory that, at the time of such funding or facilitation, is the subject of Sanctions; or

(b) in any other manner that will result in a violation of Sanctions by any Person (including any Person participating in the offering, whether as underwriter, advisor, investor or otherwise).

(iii) The Entity represents and covenants that, except as detailed in the Registration Statement and the Prospectus, for the past 5 years, it has not knowingly engaged in and is not now knowingly engaged in any dealing or transactions with any Person, or in any country or territory, that at the time of the dealing or transaction is or was the subject of Sanctions.

vv. Foreign Corrupt Practices Act. Neither the Company nor any Subsidiary nor, to the Company's knowledge, any director, officer, agent, employee or affiliate of the Company and its Subsidiaries or any other person acting on behalf of the Company or any Subsidiary, has, directly or indirectly, given or agreed to give any money, gift or similar benefit (other than legal price concessions to customers in the ordinary course of business) to any customer, supplier, employee or agent of a customer or supplier, or official or employee of any governmental agency or instrumentality of any government (domestic or foreign) or any political party or candidate for office (domestic or foreign) or other person who was, is, or may be in a position to help or hinder the business of the Company or any Subsidiary (or assist the Company or any Subsidiary in connection with any actual or proposed transaction) that (i) would subject the Company or any Subsidiary to any damage or penalty in any civil, criminal or governmental litigation or proceeding, (ii) if not given in the past, would have had a Material Adverse Effect; (iii) if not continued in the future, would result in a Material Adverse Effect. Each of the Company and each Subsidiary has taken reasonable steps to ensure that its accounting controls and procedures are sufficient to

cause the Company and each Subsidiary to comply in all material respects with the Foreign Corrupt Practices Act of 1977, as amended, and the rules and regulations thereunder (collectively, the “FCPA”) or employee; (iv) violated or is in violation of any provision of the FCPA or any applicable non-U.S. anti-bribery statute or regulation; (v) made any bribe, rebate, payoff, influence payment, kickback or other unlawful payment; or (vi) received notice of any investigation, proceeding or inquiry by any Governmental Entity regarding any of the matters in clauses (i)-(v) above; and the Company and, to the knowledge of the Company, the Company’s affiliates have conducted their respective businesses in compliance with the FCPA and have instituted and maintain policies and procedures designed to ensure, and which are reasonably expected to continue to ensure, continued compliance therewith.

ww. Stock Transfer Taxes. On each Settlement Date, all material stock transfer or other taxes (other than income taxes) which are required to be paid in connection with the sale and transfer of the Placement Shares to be sold hereunder will be, or will have been, fully paid or provided for by the Company and all laws imposing such taxes will be or will have been fully complied with by the Company in all material respects.

Any certificate signed by an officer of the Company and delivered to the Agent or to counsel for the Agent pursuant to or in connection with this Agreement shall be deemed to be a representation and warranty by the Company, as applicable, to the Agent as to the matters set forth therein.

7. Covenants of the Company. The Company covenants and agrees with the Agent that:

a. Registration Statement Amendments. After the date of this Agreement and during any period in which a prospectus relating to any Placement Shares is required to be delivered by the Agent under the Securities Act (including in circumstances where such requirement may be satisfied pursuant to Rule 172 under the Securities Act) (the “Prospectus Delivery Period”) (i) the Company will notify the Agent promptly of the time when any subsequent amendment to the Registration Statement, other than documents incorporated by reference or amendments not related to any Placement, has been filed with the Commission and/or has become effective or any subsequent supplement to the Prospectus other than documents incorporated by reference has been filed and of any request by the Commission for any amendment or supplement to the Registration Statement or Prospectus related to the Placement or for additional information related to the Placement, (ii) the Company will prepare and file with the Commission, promptly upon the Agent’s request, any amendments or supplements to the Registration Statement or Prospectus that, upon the advice of the Company’s legal counsel, may be necessary or advisable in connection with the distribution of the Placement Shares by the Agent (*provided, however*, that the failure of the Agent to make such request shall not relieve the Company of any obligation or liability hereunder, or affect the Agent’s right to rely on the representations and warranties made by the Company in this Agreement) and provided further, that the only remedy that the Agent shall have with respect to the failure to make such filings shall be to cease making sales under this agreement until such amendment or supplement is filed; (iii) the Company will not file any amendment or supplement to the Registration Statement or Prospectus relating to the Placement Shares or a security convertible into the Placement Shares (other than an Incorporated Document) unless a copy thereof has been submitted to the Agent within a reasonable period of time before the filing and the Agent has not reasonably objected thereto (*provided, however*, that (A) the failure of the Agent to make such objection shall not relieve the Company of any obligation or liability hereunder, or affect the Agent’s right to rely on the representations and warranties made by the Company in this Agreement and (B) the Company has no obligation to provide the Agent any advance copy of such filing or to provide the Agent an opportunity to object to such filing if the filing does not name the Agent or does not relate to the transaction herein provided; and provided, further, that the only remedy the Agent shall have with respect to the failure by the Company to obtain such consent shall be to cease making sales under this Agreement) and the Company will furnish to the Agent at the time of filing thereof a copy of any document that upon filing is deemed to be incorporated by reference into the Registration Statement or Prospectus, except for those documents available via EDGAR; and (iv) the Company will cause each amendment or supplement to the Prospectus to be filed with the Commission as required pursuant to the applicable paragraph of Rule 424(b) of the Securities Act or, in the case of any document to be incorporated therein by reference, to be filed with the Commission as required pursuant to the Exchange Act, within the time period prescribed (the determination to file or not file any amendment or supplement with the Commission under this Section 7(a), based on the Company’s reasonable opinion or reasonable objections, shall be made exclusively by the Company).

b. Notice of Commission Stop Orders. During any period beginning with the acceptance of a Placement Notice and ending after a Prospectus relating to any Placement Shares is no longer required to be delivered by the Agent under the Securities Act (including in circumstances where such requirement may be

satisfied pursuant to Rule 172 under the Securities Act), the Company will advise the Agent, promptly after it receives notice or obtains knowledge thereof, of the issuance or threatened issuance by the Commission of any stop order suspending the effectiveness of the Registration Statement, of the suspension of the qualification of the Placement Shares for offering or sale in any jurisdiction, or of the initiation or threatening of any proceeding for any such purpose; and it will use its commercially reasonable efforts to prevent the issuance of any stop order or to obtain its withdrawal if such a stop order should be issued. The Company will advise the Agent promptly after it receives any request by the Commission for any amendments to the Registration Statement or any amendment or supplements to the Prospectus or any Issuer Free Writing Prospectus or for additional information related to the offering of the Placement Shares or for additional information related to the Registration Statement, the Prospectus or any Issuer Free Writing Prospectus.

c. Delivery of Prospectus; Subsequent Changes. During the Prospectus Delivery Period, the Company will use its commercially reasonable efforts to comply with all requirements imposed upon it by the Securities Act, as from time to time in force, and to file on or before their respective due dates all reports and any definitive proxy or information statements required to be filed by the Company with the Commission pursuant to Sections 13(a), 13(c), 14, 15(d) or any other provision of or under the Exchange Act. If the Company has omitted any information from the Registration Statement pursuant to Rule 430A under the Securities Act, it will use its commercially reasonable efforts to comply with the provisions of and make all requisite filings with the Commission pursuant to said Rule 430A and to notify the Agent promptly of all such filings. If during the Prospectus Delivery Period any event occurs as a result of which the Prospectus as then amended or supplemented would include an untrue statement of a material fact or omit to state a material fact necessary to make the statements therein, in the light of the circumstances then existing, not misleading, or if during such Prospectus Delivery Period it is necessary to amend or supplement the Registration Statement or Prospectus to comply with the Securities Act, the Company will promptly notify the Agent to suspend the offering of Placement Shares during such period and the Company will promptly amend or supplement the Registration Statement or Prospectus (at the expense of the Company) so as to correct such statement or omission or effect such compliance; *provided, however*, that the Company may delay the filing of any amendment or supplement, if in the judgment of the Company, it is in the best interest of the Company.

d. Listing of Placement Shares. During the Prospectus Delivery Period, the Company will use its commercially reasonable efforts to cause the Placement Shares to be listed on the Exchange and to qualify the Placement Shares for sale under the securities laws of such jurisdictions in the United States as the Agent reasonably designates and to continue such qualifications in effect so long as required for the distribution of the Placement Shares; *provided, however*, that the Company shall not be required in connection therewith to qualify as a foreign corporation or dealer in securities, file a general consent to service of process, or subject itself to taxation in any jurisdiction if it is not otherwise so subject.

e. Delivery of Registration Statement and Prospectus. The Company will furnish to the Agent and its counsel (at the reasonable expense of the Company) copies of the Registration Statement, the Prospectus (including all documents incorporated by reference therein) and all amendments and supplements to the Registration Statement or Prospectus that are filed with the Commission during the Prospectus Delivery Period (including all documents filed with the Commission during such period that are deemed to be incorporated by reference therein), in each case as soon as reasonably practicable and in such quantities as the Agent may from time to time reasonably request and, at the Agent's request, will also furnish copies of the Prospectus to each exchange or market on which sales of the Placement Shares may be made; *provided, however*, that the Company shall not be required to furnish any document (other than the Prospectus) to the Agent to the extent such document is available on EDGAR.

f. Earnings Statement. The Company will make generally available to its security holders as soon as practicable, but in any event not later than 15 months after the end of the Company's current fiscal quarter, an earnings statement covering a 12-month period that satisfies the provisions of Section 11(a) and Rule 158 of the Securities Act. The Company shall be deemed to satisfy this section 7(f) through public filings made by the Company using the EDGAR system.

g. Use of Proceeds. The Company will use the Net Proceeds as described in the Prospectus in the section entitled "Use of Proceeds."

h. Notice of Other Sales. Without the prior written consent of the Agent, the Company will not, directly or indirectly, offer to sell, sell, contract to sell, grant any option to sell or otherwise dispose of any

Common Stock (other than the Placement Shares offered pursuant to this Agreement) or securities convertible into or exchangeable for Common Stock, warrants or any rights to purchase or acquire, Common Stock during the period beginning on the date on which any Placement Notice is delivered to the Agent hereunder and ending on the final Settlement Date with respect to Placement Shares sold pursuant to such Placement Notice (or, if the Placement Notice has been terminated or suspended prior to the sale of all Placement Shares covered by a Placement Notice, the date of such suspension or termination); and will not directly or indirectly in any other “at the market” or continuous equity transaction offer to sell, sell, contract to sell, grant any option to sell or otherwise dispose of any Common Stock (other than the Placement Shares offered pursuant to this Agreement) or securities convertible into or exchangeable for Common Stock, warrants or any rights to purchase or acquire, Common Stock prior to the termination of this Agreement; *provided, however*, that such restrictions will not apply in connection with the Company’s issuance or sale of (i) Common Stock, options to purchase Common Stock or Common Stock issuable upon the exercise of options, pursuant to any stock option, or benefits plan, stock ownership plan or dividend reinvestment plan (but not Common Stock subject to a waiver to exceed plan limits in any dividend reinvestment plan) of the Company whether now in effect or hereafter implemented; (ii) Common Stock issuable upon conversion of securities or the exercise of warrants, options or other rights in effect or outstanding, and disclosed in filings by the Company available on EDGAR or otherwise in writing to the Agent, (iii) Common Stock, or securities convertible into or exercisable for Common Stock, offered and sold in a privately negotiated transaction to vendors, customers, strategic partners or potential strategic partners or other investors conducted in a manner so as not to be integrated with the offering of Common Stock hereby, and (iv) Common Stock in connection with any acquisition, strategic investment or other similar transaction (including any joint venture, strategic alliance, licensing arrangement, collaboration or partnership).

i. Change of Circumstances. The Company will, at any time during the pendency of a Placement Notice advise the Agent promptly after it shall have received notice or obtained knowledge thereof, of any information or fact that would alter or affect in any material respect any opinion, certificate, letter or other document required to be provided to the Agent pursuant to this Agreement.

j. Due Diligence Cooperation. During the term of this Agreement, the Company will cooperate with any reasonable due diligence review conducted by the Agent or its representatives in connection with the transactions contemplated hereby, including, without limitation, providing information and making available documents and senior corporate officers, during regular business hours and at the Company’s principal offices, as the Agent may reasonably request.

k. Required Filings Relating to Placement of Placement Shares. The Company agrees that on such dates as the Securities Act shall require, the Company will (i) file a prospectus supplement with the Commission under the applicable paragraph of Rule 424(b) under the Securities Act (each and every date a filing under Rule 424(b) is made, a “Filing Date”), which prospectus supplement will set forth, within the relevant period, the amount of Placement Shares sold through the Agent, the Net Proceeds to the Company and the compensation payable by the Company to the Agent with respect to such Placement Shares provided that the Company may satisfy its obligations under this section 7(k) by making a filing pursuant to the Exchange Act that includes the required information, and (ii) deliver such number of copies of each such prospectus supplement to each exchange or market on which such sales were effected as may be required by the rules or regulations of such exchange or market.

l. Representation Dates; Certificate. Each time during the term of this Agreement that the Company:

(i) amends or supplements (other than a prospectus supplement relating solely to an offering of securities other than the Placement Shares) the Registration Statement or the Prospectus relating to the Placement Shares by means of a post-effective amendment, sticker, or supplement but not by means of incorporation of documents by reference into the Registration Statement or the Prospectus relating to the Placement Shares;

(ii) files an annual report on Form 10-K under the Exchange Act (including any Form 10-K/A containing amended audited financial information or a material amendment to the previously filed Form 10-K);

(iii) files its quarterly reports on Form 10-Q under the Exchange Act; or

(iv) files a current report on Form 8-K containing amended financial information (other than information “furnished” pursuant to Items 2.02 or 7.01 of Form 8-K or to provide disclosure pursuant to Item 8.01 of Form 8-K relating to the reclassification of certain properties as discontinued operations in accordance

with Statement of Financial Accounting Standards No. 144) under the Exchange Act;

(Each date of filing of one or more of the documents referred to in clauses (i) through (iv) shall be a “Representation Date.”)

the Company shall furnish the Agent (but in the case of clause (iv) above only if the Agent reasonably determines that the information contained in such Form 8-K is material) with a certificate, in the form attached hereto as Exhibit 7(1). The requirement to provide a certificate under this Section 7(1) shall be waived for any Representation Date occurring at a time at which no Placement Notice is pending, which waiver shall continue until the earlier to occur of the date the Company delivers a Placement Notice hereunder (which for such calendar quarter shall be considered a Representation Date) and the next occurring Representation Date on which the Company files its annual report on Form 10-K. Notwithstanding the foregoing, (i) upon the delivery of the first Placement Notice hereunder and (ii) if the Company subsequently decides to sell Placement Shares following a Representation Date when the Company relied on such waiver and did not provide the Agent with a certificate under this Section 7(1), then before the Agent sells any Placement Shares, the Company shall provide the Agent with a certificate, in the form attached hereto as Exhibit 7(1), dated the date of the Placement Notice.

m. Legal Opinion. On or prior to the date of the first Placement Notice given hereunder the Company shall cause to be furnished to the Agent a written opinion and a negative assurance letter of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C. (“Company Counsel”), or other counsel reasonably satisfactory to the Agent, each in form and substance reasonably satisfactory to the Agent. Thereafter, within five (5) Trading Days of each Representation Date with respect to which the Company is obligated to deliver a certificate in the form attached hereto as Exhibit 7(1) for which no waiver is applicable, the Company shall cause to be furnished to the Agent a negative assurance letter of Company Counsel in form and substance reasonably satisfactory to the Agent; provided that, in lieu of such negative assurance for subsequent periodic filings under the Exchange Act, counsel may furnish the Agent with a letter (a “Reliance Letter”) to the effect that the Agent may rely on the negative assurance letter previously delivered under this Section 7(m) to the same extent as if it were dated the date of such letter (except that statements in such prior letter shall be deemed to relate to the Registration Statement and the Prospectus as amended or supplemented as of the date of the Reliance Letter).

n. Comfort Letter. On or prior to the date of the first Placement Notice given hereunder and within five (5) Trading Days after each subsequent Representation Date, other than pursuant to Section 7(l)(iii), the Company shall cause its independent accountants to furnish the Agent letters (the “Comfort Letters”), dated the date the Comfort Letter is delivered, which shall meet the requirements set forth in this Section 7(n). The Comfort Letter from the Company’s independent accountants shall be in a form and substance reasonably satisfactory to the Agent, (i) confirming that they are an independent public accounting firm within the meaning of the Securities Act and the PCAOB, (ii) stating, as of such date, the conclusions and findings of such firm with respect to the financial information and other matters ordinarily covered by accountants’ “comfort letters” to underwriters in connection with registered public offerings (the first such letter, the “Initial Comfort Letter”) and (iii) updating the Initial Comfort Letter with any information that would have been included in the Initial Comfort Letter had it been given on such date and modified as necessary to relate to the Registration Statement and the Prospectus, as amended and supplemented to the date of such letter.

o. Market Activities. The Company will not, directly or indirectly, (i) take any action designed to cause or result in, or that constitutes or would constitute, the stabilization or manipulation of the price of any security of the Company to facilitate the sale or resale of Common Stock or (ii) sell, bid for, or purchase Common Stock in violation of Regulation M, or pay anyone any compensation for soliciting purchases of the Placement Shares other than the Agent.

p. Investment Company Act. The Company will conduct its affairs in such a manner so as to reasonably ensure that neither it nor the Subsidiaries will be or become, at any time prior to the termination of this Agreement, an “investment company,” as such term is defined in the Investment Company Act.

q. No Offer to Sell. Other than an Issuer Free Writing Prospectus approved in advance by the Company and the Agent in its capacity as agent hereunder pursuant to Section 23, neither of the Agent nor the Company (including its agents and representatives, other than the Agent in its capacity as such) will make, use, prepare, authorize, approve or refer to any written communication (as defined in Rule 405), required to be filed with the Commission, that constitutes an offer to sell or solicitation of an offer to buy Placement Shares hereunder.

r. Sarbanes-Oxley Act. The Company will maintain and keep accurate books and records

reflecting its assets and maintain internal accounting controls in a manner designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with GAAP and including those policies and procedures that (i) pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of the assets of the Company, (ii) provide reasonable assurance that transactions are recorded as necessary to permit the preparation of the Company's consolidated financial statements in accordance with GAAP, (iii) that receipts and expenditures of the Company are being made only in accordance with management's and the Company's directors' authorization, and (iv) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the Company's assets that could have a material effect on its financial statements. The Company will maintain disclosure controls and procedures that comply with the requirements of the Exchange Act.

8. Representations and Covenants of the Agent. The Agent represents and warrants that it is duly registered as a broker-dealer under FINRA, the Exchange Act and the applicable statutes and regulations of each state in which the Placement Shares will be offered and sold, except such states in which the Agent is exempt from registration or such registration is not otherwise required. The Agent shall continue, for the term of this Agreement, to be duly registered as a broker-dealer under FINRA, the Exchange Act and the applicable statutes and regulations of each state in which the Placement Shares will be offered and sold, except such states in which it is exempt from registration or such registration is not otherwise required, during the term of this Agreement. The Agent shall comply with all applicable law and regulations in connection with the transactions contemplated by this Agreement, including the issuance and sale through the Agent of the Placement Shares.

9. Payment of Expenses. The Company will pay all expenses incident to the performance of its obligations under this Agreement, including (i) the preparation, filing, including any fees required by the Commission, and printing of the Registration Statement (including financial statements and exhibits) as originally filed and of each amendment and supplement thereto and each Free Writing Prospectus, in such number as the Agent shall deem reasonably necessary, (ii) the printing and delivery to the Agent of this Agreement and such other documents as may be required in connection with the offering, purchase, sale, issuance or delivery of the Placement Shares, (iii) the preparation, issuance and delivery of the certificates, if any, for the Placement Shares to the Agent, including any stock or other transfer taxes and any capital duties, stamp duties or other duties or taxes payable upon the sale, issuance or delivery of the Placement Shares to the Agent, (iv) the fees and disbursements of the counsel, accountants and other advisors to the Company, (v) the reasonable and documented out-of-pocket fees and disbursements of counsel to the Agent up to \$40,000 plus (a) an additional \$2,500 per quarter so long as this Agreement remains in effect and the Agents perform standard quarterly due diligence with the Company, excluding any period during which a Suspension is in place pursuant to Section 4 (provided that such additional fee shall be paid upon the resumption of sales upon the ending of any Suspension); and (b) \$15,000 in connection with any filing of an additional prospectus supplement which constitutes a Prospectus Supplement; (vi) the fees and expenses of the transfer agent and registrar for the Common Stock, (vii) the filing fees incident to any review by FINRA of the terms of the sale of the Placement Shares, and (viii) the fees and expenses incurred in connection with the listing of the Placement Shares on the Exchange.

10. Conditions to the Agent's Obligations. The obligations of the Agent hereunder with respect to a Placement will be subject to the continuing accuracy and completeness of the representations and warranties made by the Company herein (other than those representations and warranties made as of a specified date or time), to the due performance in all material respects by the Company of its obligations hereunder, to the completion by the Agent of a due diligence review satisfactory to it in its reasonable judgment, and to the continuing reasonable satisfaction (or waiver by the Agent in its sole discretion) of the following additional conditions:

a. Registration Statement Effective. The Registration Statement shall remain effective and shall be available for the sale of all Placement Shares contemplated to be issued by any Placement Notice.

b. No Material Notices. None of the following events shall have occurred and be continuing: (i) receipt by the Company of any request for additional information from the Commission or any other federal or state governmental authority during the period of effectiveness of the Registration Statement, the response to which would require any post-effective amendments or supplements to the Registration Statement or the Prospectus; (ii) the issuance by the Commission or any other federal or state governmental authority of any stop order suspending the effectiveness of the Registration Statement or receipt by the Company of notification of the initiation of any proceedings for that purpose; (iii) receipt by the Company of any notification with respect to the suspension of the qualification or exemption from qualification of any of the Placement Shares for sale in any

jurisdiction or receipt by the Company of notification of the initiation of, or a threat to initiate, any proceeding for such purpose; or (iv) the occurrence of any event that makes any material statement made in the Registration Statement or the Prospectus or any material Incorporated Document untrue in any material respect or that requires the making of any changes in the Registration Statement, the Prospectus or any material Incorporated Document so that, in the case of the Registration Statement, it will not contain any materially untrue statement of a material fact or omit to state any material fact required to be stated therein or necessary to make the statements therein not misleading and, that in the case of the Prospectus or any material Incorporated Document, it will not contain any materially untrue statement of a material fact or omit to state any material fact required to be stated therein or necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading.

c. No Misstatement or Material Omission. The Agent shall not have advised the Company that the Registration Statement or Prospectus, or any amendment or supplement thereto, contains an untrue statement of fact that in the Agent's reasonable opinion is material, or omits to state a fact that in the Agent's reasonable opinion is material and is required to be stated therein or is necessary to make the statements therein not misleading.

d. Material Changes. Except as contemplated in the Prospectus, or disclosed in the Company's reports filed with the Commission, there shall not have been any Material Adverse Effect, or any development that would cause a Material Adverse Effect or interfere with the Company's ability to perform its obligations under this Agreement or to consummate the transactions contemplated by the Prospectus, or a downgrading in or withdrawal of the rating assigned to any of the Company's securities (other than asset backed securities) by any "nationally recognized statistical rating organization," as such term is defined by the Commission for purposes of Rule 436(g)(2) under the Securities Act (a "Rating Organization"), or a public announcement by any Rating Organization that it has under surveillance or review its rating of any of the Company's securities (other than asset backed securities), the effect of which, in the case of any such action by a Rating Organization described above, in the reasonable judgment of the Agent (without relieving the Company of any obligation or liability it may otherwise have), is so material as to make it impracticable or inadvisable to proceed with the offering of the Placement Shares on the terms and in the manner contemplated in the Prospectus.

e. Legal Opinion. The Agent shall have received the opinion and negative assurance letter of Company Counsel required to be delivered pursuant to Section 7(m) on or before the date on which such delivery of such opinion and negative assurance letter are required pursuant to Section 7(m).

f. Comfort Letter. The Agent shall have received the Comfort Letter required to be delivered pursuant Section 7(n) on or before the date on which such delivery of such letter is required pursuant to Section 7(n).

g. Representation Certificate. The Agent shall have received the certificate required to be delivered pursuant to Section 7(1) on or before the date on which delivery of such certificate is required pursuant to Section 7(1).

h. Secretary's Certificate. On or prior to the first Representation Date, the Agent shall have received a certificate, signed on behalf of the Company by its corporate Secretary, in form and substance satisfactory to the Agent and its counsel.

i. No Suspension. Trading in the Common Stock shall not have been suspended on the Exchange and the Common Stock shall not have been delisted from the Exchange.

j. Other Materials. On each date on which the Company is required to deliver a certificate pursuant to Section 7(1), the Company shall have furnished to the Agent such appropriate further information, certificates and documents as the Agent may reasonably request and which are usually and customarily furnished by an issuer of securities in connection with a securities offering of the type contemplated hereby. All such opinions, certificates, letters and other documents will be in compliance with the provisions hereof.

k. Securities Act Filings Made. All filings with the Commission required by Rule 424 under the Securities Act to have been filed prior to the issuance of any Placement Notice hereunder shall have been made within the applicable time period prescribed for such filing by Rule 424.

l. Approval for Listing. The Placement Shares shall either have been approved for listing on the Exchange, subject only to notice of issuance, or the Company shall have filed an application for listing of the

Placement Shares on the Exchange at, or prior to, the issuance of any Placement Notice.

m. No Termination Event. There shall not have occurred any event that would permit the Agent to terminate this Agreement pursuant to Section 13(a).

11. Indemnification and Contribution.

(a) Company Indemnification. The Company agrees to indemnify and hold harmless the Agent, its partners, members, directors, officers, employees and agents and each person, if any, who controls the Agent within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act as follows:

(i) against any and all loss, liability, claim, damage and expense whatsoever, as incurred, joint or several, arising out of or based upon any untrue statement or alleged untrue statement of a material fact contained in the Registration Statement (or any amendment thereto), or the omission or alleged omission therefrom of a material fact required to be stated therein or necessary to make the statements therein not misleading, or arising out of any untrue statement or alleged untrue statement of a material fact included in any related Issuer Free Writing Prospectus or the Prospectus (or any amendment or supplement thereto), or the omission or alleged omission therefrom of a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading;

(ii) against any and all loss, liability, claim, damage and expense whatsoever, as incurred, joint or several, to the extent of the aggregate amount paid in settlement of any litigation, or any investigation or proceeding by any governmental agency or body, commenced or threatened, or of any claim whatsoever based upon any such untrue statement or omission, or any such alleged untrue statement or omission; provided that (subject to Section 11(d) below) any such settlement is effected with the written consent of the Company, which consent shall not unreasonably be delayed or withheld; and

(iii) against any and all expense whatsoever, as incurred (including the reasonable and documented out-of-pocket fees and disbursements of counsel), reasonably incurred in investigating, preparing or defending against any litigation, or any investigation or proceeding by any governmental agency or body, commenced or threatened, or any claim whatsoever based upon any such untrue statement or omission, or any such alleged untrue statement or omission, to the extent that any such expense is not paid under (i) or (ii) above,

provided, however, that this indemnity agreement shall not apply to any loss, liability, claim, damage or expense to the extent determined by a court of competent jurisdiction and not subject to further appeal to arise out of any untrue statement or omission made solely in reliance upon and in conformity with written information furnished to the Company by the Agent expressly for use in the Registration Statement (or any amendment thereto), or in any related Issuer Free Writing Prospectus or the Prospectus (or any amendment or supplement thereto).

(b) Indemnification by the Agent. The Agent agrees to indemnify and hold harmless the Company and its directors and officers, and each person, if any, who (i) controls the Company within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act or (ii) is controlled by or is under common control with the Company against any and all loss, liability, claim, damage and expense described in the indemnity contained in Section 11(a), as incurred, but only with respect to untrue statements or omissions made in the Registration Statement (or any amendments thereto) or in any related Issuer Free Writing Prospectus or the Prospectus (or any amendment or supplement thereto) in reliance upon and in conformity with information relating to the Agent and furnished to the Company in writing by the Agent expressly for use therein.

(c) Procedure. Any party that proposes to assert the right to be indemnified under this Section 11 will, promptly after receipt of notice of commencement of any action against such party in respect of which a claim is to be made against an indemnifying party or parties under this Section 11, notify each such indemnifying party of the commencement of such action, enclosing a copy of all papers served, but the omission so to notify such indemnifying party will not relieve the indemnifying party from (i) any liability that it might have to any indemnified party otherwise than under this Section 11 and (ii) any liability that it may have to any indemnified party under the foregoing provisions of this Section 11 unless, and only to the extent that, such omission results in the forfeiture of substantive rights or defenses by the indemnifying party. If any such action is brought against any indemnified party and it notifies the indemnifying party of its commencement, the indemnifying party will be entitled to participate in and, to the extent that it elects by delivering written notice to the indemnified party promptly after receiving notice of the commencement of the action from the indemnified party, jointly with any other indemnifying party similarly notified, to assume the defense of the action, with counsel reasonably satisfactory

to the indemnified party, and after notice from the indemnifying party to the indemnified party of its election to assume the defense, the indemnifying party will not be liable to the indemnified party for any legal or other expenses except as provided below and except for the reasonable costs of investigation subsequently incurred by the indemnified party in connection with the defense. The indemnified party will have the right to employ its own counsel in any such action, but the fees, expenses and other charges of such counsel will be at the expense of such indemnified party unless (1) the employment of counsel by the indemnified party has been authorized in writing by the indemnifying party, (2) the indemnified party has reasonably concluded (based on advice of counsel) that there may be legal defenses available to it or other indemnified parties that are different from or in addition to those available to the indemnifying party, (3) a conflict or potential conflict of interest exists (based on advice of counsel to the indemnified party) between the indemnified party and the indemnifying party (in which case the indemnifying party will not have the right to direct the defense of such action on behalf of the indemnified party) or (4) the indemnifying party has not in fact employed counsel to assume the defense of such action within a reasonable time after receiving notice of the commencement of the action, in each of which cases the reasonable and documented out-of-pocket fees, disbursements and other charges of counsel will be at the expense of the indemnifying party or parties. It is understood that the indemnifying party or parties shall not, in connection with any proceeding or related proceedings in the same jurisdiction, be liable for the reasonable and documented out-of-pocket fees, disbursements and other charges of more than one separate firm admitted to practice in such jurisdiction at any one time for all such indemnified party or parties. All such reasonable and documented out-of-pocket fees, disbursements and other charges will be reimbursed by the indemnifying party promptly after the indemnifying party receives a written invoice relating to fees, disbursements and other charges in reasonable detail. An indemnifying party will not, in any event, be liable for any settlement of any action or claim effected without its written consent. No indemnifying party shall, without the prior written consent of each indemnified party, settle or compromise or consent to the entry of any judgment in any pending or threatened claim, action or proceeding relating to the matters contemplated by this Section 11 (whether or not any indemnified party is a party thereto), unless such settlement, compromise or consent (1) includes an unconditional release of each indemnified party from all liability arising out of such litigation, investigation, proceeding or claim and (2) does not include a statement as to or an admission of fault, culpability or a failure to act by or on behalf of any indemnified party.

(d) Contribution. In order to provide for just and equitable contribution in circumstances in which the indemnification provided for in the foregoing paragraphs of this Section 11 is applicable in accordance with its terms but for any reason is held to be unavailable from the Company or the Agent, the Company and the Agent will contribute to the total losses, claims, liabilities, expenses and damages (including any investigative, legal and other expenses reasonably incurred in connection with, and any amount paid in settlement of, any action, suit or proceeding or any claim asserted, but after deducting any contribution received by the Company from persons other than the Agent, such as persons who control the Company within the meaning of the Securities Act or the Exchange Act, officers of the Company who signed the Registration Statement and directors of the Company, who also may be liable for contribution) to which the Company and the Agent may be subject in such proportion as shall be appropriate to reflect the relative benefits received by the Company on the one hand and the Agent on the other hand. The relative benefits received by the Company on the one hand and the Agent on the other hand shall be deemed to be in the same proportion as the total Net Proceeds from the sale of the Placement Shares (before deducting expenses) received by the Company bear to the total compensation received by the Agent (before deducting expenses) from the sale of Placement Shares on behalf of the Company. If, but only if, the allocation provided by the foregoing sentence is not permitted by applicable law, the allocation of contribution shall be made in such proportion as is appropriate to reflect not only the relative benefits referred to in the foregoing sentence but also the relative fault of the Company, on the one hand, and the Agent, on the other hand, with respect to the statements or omission that resulted in such loss, claim, liability, expense or damage, or action in respect thereof, as well as any other relevant equitable considerations with respect to such offering. Such relative fault shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or omission or alleged omission to state a material fact relates to information supplied by the Company or the Agent, the intent of the parties and their relative knowledge, access to information and opportunity to correct or prevent such statement or omission. The Company and the Agent agree that it would not be just and equitable if contributions pursuant to this Section 11(d) were to be determined by pro rata allocation or by any other method of allocation that does not take into account the equitable considerations referred to herein. The amount paid or payable by an indemnified party as a result of the loss, claim, liability, expense, or damage, or action in respect thereof, referred to above in this Section 11(d) shall be deemed to include, for the purpose of this Section 11(d), any legal or other expenses reasonably incurred by such indemnified party in connection with investigating or defending any

such action or claim to the extent consistent with Section 11(c) hereof. Notwithstanding the foregoing provisions of this Section 11(d), the Agent shall not be required to contribute any amount in excess of the commissions received by it under this Agreement and no person found guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Securities Act) will be entitled to contribution from any person who was not guilty of such fraudulent misrepresentation. For purposes of this Section 11(d), any person who controls a party to this Agreement within the meaning of the Securities Act or the Exchange Act, and any officers, directors, partners, employees or agents of the Agent, will have the same rights to contribution as that party, and each officer who signed the Registration Statement and director of the Company will have the same rights to contribution as the Company, subject in each case to the provisions hereof. Any party entitled to contribution, promptly after receipt of notice of commencement of any action against such party in respect of which a claim for contribution may be made under this Section 11(d), will notify any such party or parties from whom contribution may be sought, but the omission to so notify will not relieve that party or parties from whom contribution may be sought from any other obligation it or they may have under this Section 11(d) except to the extent that the failure to so notify such other party materially prejudiced the substantive rights or defenses of the party from whom contribution is sought. Except for a settlement entered into pursuant to the last sentence of Section 11(c) hereof, no party will be liable for contribution with respect to any action or claim settled without its written consent if such consent is required pursuant to Section 11(c) hereof.

12. Representations and Agreements to Survive Delivery. The indemnity and contribution agreements contained in Section 11 of this Agreement and all representations and warranties of the Company herein or in certificates delivered pursuant hereto shall survive, as of their respective dates, regardless of (i) any investigation made by or on behalf of the Agent, any controlling persons, or the Company (or any of their respective officers, directors or controlling persons), (ii) delivery and acceptance of the Placement Shares and payment therefor or (iii) any termination of this Agreement.

13. Termination.

a. The Agent may terminate this Agreement, by written notice to the Company, as hereinafter specified at any time (1) if there has been, since the time of execution of this Agreement or since the date as of which information is given in the Prospectus, any Material Adverse Effect, or any development that would have a Material Adverse Effect that, in the sole judgment of the Agent, is material and adverse and makes it impractical or inadvisable to market the Placement Shares or to enforce contracts for the sale of the Placement Shares, (2) if there has occurred any material adverse change in the financial markets in the United States or the international financial markets, any outbreak of hostilities or escalation thereof or other calamity or crisis or any change or development involving a prospective change in national or international political, financial or economic conditions, in each case the effect of which is such as to make it, in the judgment of the Agent, impracticable or inadvisable to market the Placement Shares or to enforce contracts for the sale of the Placement Shares, (3) if trading in the Common Stock has been suspended or limited by the Commission or the Exchange, or if trading generally on the Exchange has been suspended or limited, or minimum prices for trading have been fixed on the Exchange, (4) if any suspension of trading of any securities of the Company on any exchange or in the over-the-counter market shall have occurred and be continuing, (5) if a major disruption of securities settlements or clearance services in the United States shall have occurred and be continuing, or (6) if a banking moratorium has been declared by either U.S. Federal or New York authorities. Any such termination shall be without liability of any party to any other party except that the provisions of Section 9 (Payment of Expenses), Section 11 (Indemnification and Contribution), Section 12 (Representations and Agreements to Survive Delivery), Section 18 (Governing Law and Time; Waiver of Jury Trial), Section 19 (Consent to Jurisdiction) and Section 20 (Use of Information) hereof shall remain in full force and effect notwithstanding such termination. If the Agent elects to terminate this Agreement as provided in this Section 13(a), the Agent shall provide the required notice as specified in Section 14 (Notices).

b. The Company shall have the right, by giving five (5) days' notice as hereinafter specified to terminate this Agreement in its sole discretion at any time after the date of this Agreement. Any such termination shall be without liability of any party to any other party except that the provisions of Section 9 (Payment of Expenses), Section 11 (Indemnification and Contribution), Section 12 (Representations and Agreements to Survive Delivery), Section 18 (Governing Law and Time; Waiver of Jury Trial), Section 19 (Consent to Jurisdiction) and Section 20 (Use of Information) hereof shall remain in full force and effect notwithstanding such termination.

c. The Agent shall have the right, by giving five (5) days' notice as hereinafter specified to terminate this Agreement in its sole discretion at any time after the date of this Agreement. Any such termination shall be without liability of any party to any other party except that the provisions of Section 9 (Payment of

Expenses), Section 11 (Indemnification and Contribution), Section 12 (Representations and Agreements to Survive Delivery), Section 18 (Governing Law and Time; Waiver of Jury Trial), Section 19 (Consent to Jurisdiction) and Section 20 (Use of Information) hereof shall remain in full force and effect notwithstanding such termination.

d. Unless earlier terminated pursuant to this Section 13, this Agreement shall automatically terminate upon the issuance and sale of all of the Placement Shares through the Agent on the terms and subject to the conditions set forth herein except that the provisions of Section 9 (Payment of Expenses), Section 11 (Indemnification and Contribution), Section 12 (Representations and Agreements to Survive Delivery), Section 18 (Governing Law and Time; Waiver of Jury Trial), Section 19 (Consent to Jurisdiction) and Section 20 (Use of Information) hereof shall remain in full force and effect notwithstanding such termination.

e. This Agreement shall remain in full force and effect unless terminated pursuant to Sections 13(a), (b), (c), or (d) above or otherwise by mutual agreement of the parties; *provided, however*, that any such termination by mutual agreement shall in all cases be deemed to provide that Section 9 (Payment of Expenses), Section 11 (Indemnification and Contribution), Section 12 (Representations and Agreements to Survive Delivery), Section 18 (Governing Law and Time; Waiver of Jury Trial), Section 19 (Consent to Jurisdiction) and Section 20 (Use of Information) shall remain in full force and effect. Upon termination of this Agreement, the Company shall not have any liability to the Agent for any discount, commission or other compensation with respect to any Placement Shares not otherwise sold by the Agent under this Agreement.

f. Any termination of this Agreement shall be effective on the date specified in such notice of termination; *provided, however*, that such termination shall not be effective until the close of business on the date of receipt of such notice by the Agent or the Company, as the case may be. If such termination shall occur prior to the Settlement Date for any sale of Placement Shares, such Placement Shares shall settle in accordance with the provisions of this Agreement.

14. Notices. All notices or other communications required or permitted to be given by any party to any other party pursuant to the terms of this Agreement shall be in writing, unless otherwise specified, and if sent to the Agent, shall be delivered to:

B. Riley Securities, Inc.	
299 Park Avenue	
New York, NY 10171	
Attention:	General Counsel
Telephone:	(212) 457-9947
Email:	atmdesk@brileyfin.com

with a copy to:

Blank Rome LLP	
1271 Avenue of the Americas	
New York, NY 10020	
Attention:	Brad L. Shiffman
Telephone:	(212) 885- 5442
Email:	BShiffman@blankrome.com

and if to the Company, shall be delivered to:

Aspen Aerogels, Inc.	
30 Forbes Road, Building B	
Northborough, MA 01531	
Attention:	John Fairbanks
Telephone:	(508) 691-1150
Email:	jfairbanks@AEROGEL.COM

with a copy to:

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.
One Financial Center
Boston, MA 02111

Attention: Sahir Surmeli
Telephone: (617) 348-3050
Email: ssurmeli@mintz.com

Each party to this Agreement may change such address for notices by sending to the parties to this Agreement written notice of a new address for such purpose. Each such notice or other communication shall be deemed given (i) when delivered personally, by email, or by verifiable facsimile transmission on or before 4:30 p.m., New York City time, on a Business Day or, if such day is not a Business Day, on the next succeeding Business Day, (ii) on the next Business Day after timely delivery to a nationally-recognized overnight courier and (iii) on the Business Day actually received if deposited in the U.S. mail (certified or registered mail, return receipt requested, postage prepaid). For purposes of this Agreement, "Business Day" shall mean any day on which the Exchange and commercial banks in the City of New York are open for business.

15. Successors and Assigns. This Agreement shall inure to the benefit of and be binding upon the Company and the Agent and their respective successors and the affiliates, controlling persons, officers and directors referred to in Section 11 hereof. References to any of the parties contained in this Agreement shall be deemed to include the successors and permitted assigns of such party. Nothing in this Agreement, express or implied, is intended to confer upon any party other than the parties hereto or their respective successors and permitted assigns any rights, remedies, obligations or liabilities under or by reason of this Agreement, except as expressly provided in this Agreement. Neither the Company nor the Agent may assign its rights or obligations under this Agreement without the prior written consent of the other party.

16. Adjustments for Stock Splits. The parties acknowledge and agree that all share-related numbers contained in this Agreement shall be adjusted to take into account any share consolidation, stock split, stock dividend, corporate domestication or similar event effected with respect to the Placement Shares.

17. Entire Agreement; Amendment; Severability. This Agreement (including all schedules and exhibits attached hereto and Placement Notices issued pursuant hereto) constitutes the entire agreement and supersedes all other prior and contemporaneous agreements and undertakings, both written and oral, among the parties hereto with regard to the subject matter hereof. Neither this Agreement nor any term hereof may be amended except pursuant to a written instrument executed by the Company and the Agent. In the event that any one or more of the provisions contained herein, or the application thereof in any circumstance, is held invalid, illegal or unenforceable as written by a court of competent jurisdiction, then such provision shall be given full force and effect to the fullest possible extent that it is valid, legal and enforceable, and the remainder of the terms and provisions herein shall be construed as if such invalid, illegal or unenforceable term or provision was not contained herein, but only to the extent that giving effect to such provision and the remainder of the terms and provisions hereof shall be in accordance with the intent of the parties as reflected in this Agreement.

18. GOVERNING LAW AND TIME; WAIVER OF JURY TRIAL. THIS AGREEMENT SHALL BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE LAWS OF THE STATE OF NEW YORK WITHOUT REGARD TO THE PRINCIPLES OF CONFLICTS OF LAWS. SPECIFIED TIMES OF DAY REFER TO NEW YORK CITY TIME. THE COMPANY AND THE AGENT EACH HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, ANY AND ALL RIGHT TO TRIAL BY JURY IN ANY LEGAL PROCEEDING ARISING OUT OF OR RELATING TO THIS AGREEMENT OR THE TRANSACTIONS CONTEMPLATED HEREBY.

19. CONSENT TO JURISDICTION. EACH PARTY HEREBY IRREVOCABLY SUBMITS TO THE NON-EXCLUSIVE JURISDICTION OF THE STATE AND FEDERAL COURTS SITTING IN THE CITY OF NEW YORK, BOROUGH OF MANHATTAN, FOR THE ADJUDICATION OF ANY DISPUTE HEREUNDER OR IN CONNECTION WITH ANY TRANSACTION CONTEMPLATED HEREBY, AND HEREBY IRREVOCABLY WAIVES, AND AGREES NOT TO ASSERT IN ANY SUIT, ACTION OR PROCEEDING, ANY CLAIM THAT IT IS NOT PERSONALLY SUBJECT TO THE JURISDICTION OF ANY SUCH COURT, THAT SUCH SUIT, ACTION OR PROCEEDING IS BROUGHT IN AN INCONVENIENT FORUM OR THAT THE VENUE OF SUCH SUIT, ACTION OR PROCEEDING IS IMPROPER. EACH PARTY HEREBY IRREVOCABLY WAIVES PERSONAL SERVICE OF PROCESS AND CONSENTS TO PROCESS BEING SERVED IN ANY SUCH SUIT, ACTION OR PROCEEDING BY MAILING A COPY THEREOF (CERTIFIED OR REGISTERED MAIL, RETURN RECEIPT REQUESTED) TO SUCH PARTY AT THE ADDRESS IN EFFECT FOR NOTICES TO IT UNDER THIS AGREEMENT AND AGREES THAT SUCH

SERVICE SHALL CONSTITUTE GOOD AND SUFFICIENT SERVICE OF PROCESS AND NOTICE THEREOF. NOTHING CONTAINED HEREIN SHALL BE DEEMED TO LIMIT IN ANY WAY ANY RIGHT TO SERVE PROCESS IN ANY MANNER PERMITTED BY LAW.

20. Use of Information. The Agent may not use or disclose any information gained in connection with this Agreement and the transactions contemplated by this Agreement, including due diligence, to advise any party with respect to transactions not expressly approved by the Company.

21. Counterparts. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Delivery of an executed Agreement by one party to the other may be made by facsimile transmission or email of a .pdf attachment.

22. Effect of Headings. The section, Schedule and Exhibit headings herein are for convenience only and shall not affect the construction hereof.

23. Permitted Free Writing Prospectuses. The Company represents, warrants and agrees that, unless it obtains the prior consent of the Agent, which consent shall not be unreasonably withhold, conditioned or delayed, and the Agent represents, warrants and agrees that, unless it obtains the prior consent of the Company, which consent shall not be unreasonably withheld, conditioned or delayed, it has not made and will not make any offer relating to the Placement Shares that would constitute an Issuer Free Writing Prospectus, or that would otherwise constitute a “free writing prospectus,” as defined in Rule 405, required to be filed with the Commission. Any such free writing prospectus consented to by the Agent or by the Company, as the case may be, is hereinafter referred to as a “Permitted Free Writing Prospectus.” The Company represents and warrants that it has treated and agrees that it will treat each Permitted Free Writing Prospectus as an “issuer free writing prospectus,” as defined in Rule 433, and has complied and will comply with the requirements of Rule 433 applicable to any Permitted Free Writing Prospectus, including timely filing with the Commission where required, legending and record keeping. For the purposes of clarity, the parties hereto agree that all free writing prospectuses, if any, listed in Exhibit 23 hereto are Permitted Free Writing Prospectuses.

24. Absence of Fiduciary Relationship. The Company acknowledges and agrees that:

a. the Agent is acting solely as agent in connection with the public offering of the Placement Shares and in connection with each transaction contemplated by this Agreement and the process leading to such transactions, and no fiduciary or advisory relationship between the Company or any of its respective affiliates, stockholders (or other equity holders), creditors or employees or any other party, on the one hand, and the Agent, on the other hand, has been or will be created in respect of any of the transactions contemplated by this Agreement, irrespective of whether or not the Agent has advised or is advising the Company on other matters, and the Agent has no obligation to the Company with respect to the transactions contemplated by this Agreement except the obligations expressly set forth in this Agreement;

b. it is capable of evaluating and understanding, and understands and accepts, the terms, risks and conditions of the transactions contemplated by this Agreement;

c. the Agent has not provided any legal, accounting, regulatory or tax advice with respect to the transactions contemplated by this Agreement and it has consulted its own legal, accounting, regulatory and tax advisors to the extent it has deemed appropriate;

d. it is aware that the Agent and its affiliates are engaged in a broad range of transactions which may involve interests that differ from those of the Company and the Agent has no obligation to disclose such interests and transactions to the Company by virtue of any fiduciary, advisory or agency relationship or otherwise; and

e. it waives, to the fullest extent permitted by law, any claims it may have against the Agent for breach of fiduciary duty or alleged breach of fiduciary duty in connection with the sale of Placement Shares under this Agreement and agrees that the Agent shall not have any liability (whether direct or indirect, in contract, tort or otherwise) to it in respect of such a fiduciary duty claim or to any person asserting a fiduciary duty claim on its behalf or in right of it or the Company, employees or creditors of Company, other than in respect of the Agent’s obligations under this Agreement and to keep information provided by the Company to the Agent and its counsel confidential to the extent not otherwise publicly-available.

25. Definitions. As used in this Agreement, the following terms have the respective meanings set

forth below:

“Applicable Time” means (i) each Representation Date and (ii) the time of each sale of any Placement Shares pursuant to this Agreement.

“Issuer Free Writing Prospectus” means any “issuer free writing prospectus,” as defined in Rule 433, relating to the Placement Shares that (1) is required to be filed with the Commission by the Company, (2) is a “road show” that is a “written communication” within the meaning of Rule 433(d)(8)(i) whether or not required to be filed with the Commission, or (3) is exempt from filing pursuant to Rule 433(d)(5)(i) because it contains a description of the Placement Shares or of the offering that does not reflect the final terms, in each case in the form filed or required to be filed with the Commission or, if not required to be filed, in the form retained in the Company’s records pursuant to Rule 433(g) under the Securities Act.

“Rule 172,” “Rule 405,” “Rule 415,” “Rule 424,” “Rule 424(b),” “Rule 430B,” and “Rule 433” refer to such rules under the Securities Act.

All references in this Agreement to financial statements and schedules and other information that is “contained,” “included” or “stated” in the Registration Statement or the Prospectus (and all other references of like import) shall be deemed to mean and include all such financial statements and schedules and other information that is incorporated by reference in the Registration Statement or the Prospectus, as the case may be.

All references in this Agreement to the Registration Statement, the Prospectus or any amendment or supplement to any of the foregoing shall be deemed to include the copy filed with the Commission pursuant to EDGAR; all references in this Agreement to any Issuer Free Writing Prospectus (other than any Issuer Free Writing Prospectuses that, pursuant to Rule 433, are not required to be filed with the Commission) shall be deemed to include the copy thereof filed with the Commission pursuant to EDGAR; and all references in this Agreement to “supplements” to the Prospectus shall include, without limitation, any supplements, “wrappers” or similar materials prepared in connection with any offering, sale or private placement of any Placement Shares by the Agent outside of the United States.

[Remainder of the page intentionally left blank]

If the foregoing correctly sets forth the understanding between the Company and the Agent, please so indicate in the space provided below for that purpose, whereupon this letter shall constitute a binding agreement between the Company and the Agent.

Very truly yours,

ASPEN AEROGELS, INC.

By:
F. Fairbanks

/s/ John

Name: John F. Fairbanks
Title: Vice President, Chief Financial Officer and Treasurer

ACCEPTED as of the date first-above written:

B. RILEY SECURITIES, INC.

By: /s/ Patrice McNicoll
Name: Patrice McNicoll
Title: Co-head of Investment Banking

SCHEDULE 1

FORM OF PLACEMENT NOTICE

From: Aspen Aerogels, Inc.

To: B. Riley Securities, Inc.

Attention: [•]

Subject: At Market Issuance--Placement Notice

Gentlemen:

Pursuant to the terms and subject to the conditions contained in the At Market Issuance Sales Agreement between Aspen Aerogels, Inc., a Delaware corporation (the “Company”), and B. Riley Securities, Inc. (the “Agent”), dated [•], 2020, the Company hereby requests that the Agent sell up to \$[] of the Company’s Common Stock, par value \$0.00001 per share, at a minimum market price of \$[] per share, during the time period beginning [month, day, time] and ending [month, day, time].

SCHEDULE 2

Compensation

The Company shall pay to the Agent in cash, upon each sale of Placement Shares pursuant to this Agreement, an amount equal to 3.0% of the gross proceeds from each sale of Placement Shares.

SCHEDULE 3

Notice Parties

The Company

Donald Young dyoung@AEROGEL.COM
John Fairbanks jfairbanks@AEROGEL.COM

The Agent

Seth Appel sappel@brileyfin.com
Scott Ammaturo sammatur@brileyfin.com
Ramzi Nassar rnassar@brileyfin.com
Patrice McNicoll pmcnicoll@brileyfin.com
Keith Pompliano kpompliano@brileyfin.com
with a copy to atmdesk@brileyfin.com

SCHEDULE 6(g)

Subsidiaries

<u>Company</u>	<u>Jurisdiction</u>
Aspen Aerogels Georgia, LLC, a Georgia limited liability company	
Aspen Aerogels Germany GmbH, a German entity	
Aspen Aerogels Rhode Island, LLC, a Rhode Island limited liability company	

EXHIBIT 7(1)
Form of Representation Date Certificate
_____, 20____

This Representation Date Certificate (this "Certificate") is executed and delivered in connection with Section 7(1) of the At Market Issuance Sales Agreement (the "Agreement"), dated [•], 2020, and entered into between Aspen Aerogels, Inc. (the "Company") and B. Riley Securities, Inc. (the "Agent"). All capitalized terms used but not defined herein shall have the meanings given to such terms in the Agreement.

The Company hereby certifies as follows:

1. As of the date of this Certificate (i) the Registration Statement does not contain any untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary in order to make the statements therein not misleading and (ii) neither the Registration Statement nor the Prospectus contain any untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary in order to make the statements therein, in light of the circumstances under which they were made, not misleading and (iii) no event has occurred as a result of which it is necessary to amend or supplement the Prospectus in order to make the statements therein not untrue or misleading for this paragraph 1 to be true.
 2. Each of the representations and warranties of the Company contained in the Agreement were, when originally made, and are, as of the date of this Certificate, true and correct in all material respects.
 3. Except as waived by the Agent in writing, each of the covenants required to be performed by the Company in the Agreement on or prior to the date of the Agreement, this Representation Date, and each such other date prior to the date hereof as set forth in the Agreement, has been duly, timely and fully performed in all material respects and each condition required to be complied with by the Company on or prior to the date of the Agreement, this Representation Date, and each such other date prior to the date hereof as set forth in the Agreement has been duly, timely and fully complied with in all material respects.
 4. Subsequent to the date of the most recent financial statements in the Prospectus, and except as described in the Prospectus, including Incorporated Documents, there has been no Material Adverse Effect.
 5. No stop order suspending the effectiveness of the Registration Statement or of any part thereof has been issued, and no proceedings for that purpose have been instituted or are pending or threatened by any securities or other governmental authority (including, without limitation, the Commission).
 6. No order suspending the effectiveness of the Registration Statement or the qualification or registration of the Placement Shares under the securities or Blue Sky laws of any
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jurisdiction are in effect and no proceeding for such purpose is pending before, or threatened, to the Company's knowledge or in writing by, any securities or other governmental authority (including, without limitation, the Commission).

The undersigned has executed this Representation Date Certificate as of the date first written above.

ASPEN AEROGELS, INC.

By:

Name:

Title:

EXHIBIT 23

Permitted Issuer Free Writing Prospectuses

None.

CERTIFICATIONS UNDER SECTION 302

I, Donald R. Young, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Aspen Aerogels, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 5, 2020

/s/ Donald R. Young

Donald R. Young
President and Chief Executive Officer
(principal executive officer)

CERTIFICATIONS UNDER SECTION 302

I, John F. Fairbanks, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Aspen Aerogels, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 5, 2020

/s/ John F. Fairbanks

John F. Fairbanks

Vice President, Chief Financial Officer and Treasurer (principal financial officer and principal accounting officer)

CERTIFICATIONS UNDER SECTION 906

Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 (subsections (a) and (b) of section 1350, chapter 63 of title 18, United States Code), each of the undersigned officers of Aspen Aerogels, Inc., a Delaware corporation (the “Company”), does hereby certify, to such officer’s knowledge, that:

The Quarterly Report on Form 10-Q for the quarter ended September 30, 2020 (the “Form 10-Q”) of the Company fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, and the information contained in the Form 10-Q fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: November 5, 2020

/s/ Donald R. Young

Donald R. Young
President and Chief Executive Officer
(principal executive officer)

Dated: November 5, 2020

/s/ John F. Fairbanks

John F. Fairbanks
Vice President, Chief Financial Officer and Treasurer
(principal financial officer and principal accounting officer)

A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.