# UNITED STATES
# SECURITIES AND EXCHANGE COMMISSION
**WASHINGTON, DC 20549**

# FORM 10-Q

☒ **Quarterly report pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934**

**For the quarterly period ended June 30, 2019**

☐ **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 001-33957**

# HARVARD BIOSCIENCE, INC.
**(Exact Name of Registrant as Specified in Its Charter)**

| **Delaware**<br>**(State or Other Jurisdiction of Incorporation or Organization)** | **04-3306140**<br>**(IRS Employer Identification No.)** |
|---|---|
| **84 October Hill Road, Holliston, MA**<br>**(Address of Principal Executive Offices)** | **01746**<br>**(Zip Code)** |

**(508) 893-8999**
**(Registrant's telephone number, including area code)**

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

| Title of each class | Trading Symbol(s) | Name of each exchange on which registered |
|---|---|---|
| Common Stock, $0.01 par value | HBIO | The NASDAQ Stock Market |

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, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act.

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

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

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

Indicate the number of shares outstanding of each of the issuer's classes of common stock, as of the latest practicable date.

As of August 1, 2019, there were 38,046,001 shares of common stock, par value $0.01 per share, outstanding.

**HARVARD BIOSCIENCE, INC.**

**FORM 10-Q**
**For the Quarter Ended June 30, 2019**

**INDEX**


| | | Page |
|---|---|---|
| PART I - FINANCIAL INFORMATION | | |
| Item 1. | Financial Statements | |
| | Consolidated Balance Sheets as of June 30, 2019 and December 31, 2018 (unaudited) | 3 |
| | Consolidated Statements of Operations and Comprehensive Income (Loss) for the Three and Six Months Ended June 30, 2019 and 2018 (unaudited) | 4 |
| | Consolidated Statement of Stockholders' Equity for the Three Months Ended June 30, 2019 and 2018 (unaudited) | 5 |
| | Consolidated Statement of Stockholders' Equity for the Six Months Ended June 30, 2019 and 2018 (unaudited) | 6 |
| | Consolidated Statements of Cash Flows for the Six Months Ended June 30, 2019 and 2018 (unaudited) | 7 |
| | Notes to Unaudited Consolidated Financial Statements | 8 |
| Item 2. | Management’s Discussion and Analysis of Financial Condition and Results of Operations | 26 |
| Item 3. | Quantitative and Qualitative Disclosures about Market Risk | 37 |
| Item 4. | Controls and Procedures | 37 |
| PART II - OTHER INFORMATION | | 38 |
| Item 1A. | Risk Factors | 38 |
| Item 6. | Exhibits | 38 |
| SIGNATURES | | 39 |

## PART I. FINANCIAL INFORMATION

**Item 1. Financial Statements.**

### HARVARD BIOSCIENCE, INC.
### CONSOLIDATED BALANCE SHEETS
### (Unaudited, in thousands, except share and per share data)

| | June 30, 2019 | December 31, 2018 |
|---|---|---|
| **Assets** | | |
| Current assets: | | |
| Cash and cash equivalents | $ 4,934 | $ 8,173 |
| Accounts receivable, net of allowance for doubtful accounts of $370 and $332, respectively | 18,388 | 21,463 |
| Inventories | 25,288 | 25,087 |
| Other receivables and other assets | 3,883 | 3,109 |
| Total current assets | 52,493 | 57,832 |
| | | |
| Property, plant and equipment, net | 5,359 | 5,898 |
| Operating lease right-of-use assets | 8,846 | - |
| Deferred income tax assets | 210 | 211 |
| Amortizable intangible assets, net | 40,670 | 44,532 |
| Goodwill | 57,239 | 57,304 |
| Other indefinite lived intangible assets | 1,230 | 1,232 |
| Other assets | 191 | 1,604 |
| Total assets | $ 166,238 | $ 168,613 |
| | | |
| **Liabilities and Stockholders' Equity** | | |
| Current liabilities: | | |
| Current portion, long-term debt | $ 2,407 | $ 5,982 |
| Current portion, operating lease liabilities | 2,295 | - |
| Accounts payable | 6,041 | 7,359 |
| Deferred revenue | 3,532 | 3,820 |
| Accrued income taxes | 612 | 978 |
| Accrued expenses | 4,264 | 5,762 |
| Other liabilities - current | 1,710 | 1,588 |
| Total current liabilities | 20,861 | 25,489 |
| | | |
| Long-term debt, less current installments | 52,414 | 54,813 |
| Deferred income tax liabilities | 2,309 | 2,301 |
| Operating lease liabilities | 8,714 | - |
| Other long term liabilities | 1,610 | 3,286 |
| Total liabilities | 85,908 | 85,889 |
| | | |
| Commitments and contingencies | | |
| | | |
| Stockholders' equity: | | |
| Preferred stock, par value $0.01 per share, 5,000,000 shares authorized | - | - |
| Common stock, par value $0.01 per share, 80,000,000 shares authorized; 45,639,892 and 45,124,309 shares issued and 37,894,385 and 37,378,802 shares outstanding, respectively | 436 | 436 |
| Additional paid-in-capital | 227,249 | 226,377 |
| Accumulated deficit | (122,506) | (119,889) |
| Accumulated other comprehensive loss | (14,181) | (13,532) |
| Treasury stock at cost, 7,745,507 common shares | (10,668) | (10,668) |
| Total stockholders' equity | 80,330 | 82,724 |
| Total liabilities and stockholders' equity | $ 166,238 | $ 168,613 |

See accompanying notes to unaudited consolidated financial statements.

**HARVARD BIOSCIENCE, INC.**
**CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE LOSS**
**(Unaudited, in thousands, except per share data)**

| | Three Months Ended June 30, | | Six Months Ended June 30, | |
|---|---|---|---|---|
| | 2019 | 2018 | 2019 | 2018 |
| Revenues | $ 29,584 | $ 31,522 | $ 57,786 | $ 58,281 |
| Cost of revenues | 13,629 | 16,167 | 25,677 | 29,657 |
| Gross profit | 15,955 | 15,355 | 32,109 | 28,624 |
| Sales and marketing expenses | 5,770 | 6,309 | 12,076 | 11,955 |
| General and administrative expenses | 4,809 | 5,258 | 10,612 | 10,642 |
| Research and development expenses | 2,771 | 2,758 | 5,506 | 5,160 |
| Amortization of intangible assets | 1,436 | 1,412 | 2,866 | 2,515 |
| Impairment charges | 941 | - | 941 | - |
| Total operating expenses | 15,727 | 15,737 | 32,001 | 30,272 |
| Operating income (loss) | 228 | (382) | 108 | (1,648) |
| Other expense: | | | | |
| Foreign exchange | 86 | 345 | (93) | (2) |
| Interest expense, net | (1,376) | (1,483) | (2,781) | (2,377) |
| Other expense, net | (70) | (347) | (160) | (3,085) |
| Other expense, net | (1,360) | (1,485) | (3,034) | (5,464) |
| Loss from continuing operations before income taxes | (1,132) | (1,867) | (2,926) | (7,112) |
| Income tax (benefit) expense | (885) | (369) | (309) | 236 |
| Loss from continuing operations | (247) | (1,498) | (2,617) | (7,348) |
| Discontinued operations: | | | | |
| Income from discontinued operations before income taxes | - | 24 | - | 937 |
| Income tax benefit | - | (10) | - | (883) |
| Income from discontinued operations | - | 34 | - | 1,820 |
| Net loss | $ (247) | $ (1,464) | $ (2,617) | $ (5,528) |
| (Loss) earnings per share: | | | | |
| Basic loss per common share from continuing operations | $ (0.01) | $ (0.04) | $ (0.07) | $ (0.21) |
| Basic earnings per common share from discontinued operations | - | - | - | 0.05 |
| Basic loss per common share | $ (0.01) | $ (0.04) | $ (0.07) | $ (0.15) |
| Diluted loss per common share from continuing operations | $ (0.01) | $ (0.04) | $ (0.07) | $ (0.21) |
| Diluted earnings per common share from discontinued operations | - | - | - | 0.05 |
| Diluted loss per common share | $ (0.01) | $ (0.04) | $ (0.07) | $ (0.15) |
| Weighted average common shares: | | | | |
| Basic | 37,736 | 36,082 | 37,683 | 35,774 |
| Diluted | 37,736 | 36,082 | 37,683 | 35,774 |
| Comprehensive loss: | | | | |
| Net loss | $ (247) | $ (1,464) | $ (2,617) | $ (5,528) |
| Foreign currency translation adjustments | (195) | (2,938) | (191) | (1,432) |
| Derivatives qualifying as hedges, net of tax: | | | | |
| (Loss) gain on derivative instruments designated and qualifying as cash flow hedges | (298) | 155 | (494) | (99) |
| Amounts reclassified from accumulated other comprehensive loss to net loss | 19 | 70 | 36 | 45 |
| Total comprehensive loss | $ (721) | $ (4,177) | $ (3,266) | $ (7,014) |

See accompanying notes to unaudited consolidated financial statements.

**HARVARD BIOSCIENCE, INC.**
**CONSOLIDATED STATEMENT OF STOCKHOLDERS' EQUITY**
**(Unaudited, in thousands)**

**Three Months Ended June 30, 2019**

| | Number of Shares Issued | Common Stock | Additional Paid-in Capital | Accumulated Deficit | Accumulated Other Comprehensive Loss | Treasury Stock | Total Stockholders' Equity |
|---|---|---|---|---|---|---|---|
| Balance at March 31, 2019 | 45,433 | $ 436 | $ 226,547 | $ (122,259) | $ (13,707) | $ (10,668) | $ 80,349 |
| Stock option exercises | - | - | - | - | - | - | - |
| Stock purchase plan | 94 | - | 89 | - | - | - | 89 |
| Vesting of restricted stock units | 114 | - | - | - | - | - | - |
| Shares withheld for taxes | (1) | - | (2) | - | - | - | (2) |
| Stock compensation expense | - | - | 615 | - | - | - | 615 |
| Net loss | - | - | - | (247) | - | - | (247) |
| Other comprehensive loss | - | - | - | - | (474) | - | (474) |
| Balance at June 30, 2019 | 45,640 | $ 436 | $ 227,249 | $ (122,506) | $ (14,181) | $ (10,668) | $ 80,330 |

**Three Months Ended June 30, 2018**

| | Number of Shares Issued | Common Stock | Additional Paid-in Capital | Accumulated Deficit | Accumulated Other Comprehensive Loss | Treasury Stock | Total Stockholders' Equity |
|---|---|---|---|---|---|---|---|
| Balance at March 31, 2018 | 43,409 | $ 422 | $ 220,020 | $ (121,031) | $ (9,449) | $ (10,668) | $ 79,294 |
| Stock option exercises | 421 | 2 | 1,167 | - | - | - | 1,169 |
| Stock purchase plan | 25 | - | (11) | - | - | - | (11) |
| Vesting of restricted stock units | 273 | 3 | - | - | - | - | 3 |
| Shares withheld for taxes | (26) | - | - | - | - | - | - |
| Stock compensation expense | - | - | 734 | - | - | - | 734 |
| Net loss | - | - | - | (1,464) | - | - | (1,464) |
| Other comprehensive loss | - | - | - | - | (2,713) | - | (2,713) |
| Balance at June 30, 2018 | 44,102 | $ 427 | $ 221,910 | $ (122,495) | $ (12,162) | $ (10,668) | $ 77,012 |

See accompanying notes to unaudited consolidated financial statements.

Table of Contents

**HARVARD BIOSCIENCE, INC.**
**CONSOLIDATED STATEMENT OF STOCKHOLDERS' EQUITY**
**(Unaudited, in thousands)**

**Six Months Ended June 30, 2019**

| | Number of Shares Issued | Common Stock | Additional Paid-in Capital | Accumulated Deficit | Accumulated Other Comprehensive Loss | Treasury Stock | Total Stockholders' Equity |
|---|---|---|---|---|---|---|---|
| Balance at December 31, 2018 | 45,124 | $ 436 | $ 226,377 | $ (119,889) | $ (13,532) | $ (10,668) | $ 82,724 |
| Stock option exercises | 3 | - | - | - | - | - | - |
| Stock purchase plan | 94 | - | 89 | - | - | - | 89 |
| Vesting of restricted stock units | 554 | - | - | - | - | - | - |
| Shares withheld for taxes | (135) | - | (423) | - | - | - | (423) |
| Stock compensation expense | - | - | 1,206 | - | - | - | 1,206 |
| Net loss | - | - | - | (2,617) | - | - | (2,617) |
| Other comprehensive loss | - | - | - | - | (649) | - | (649) |
| Balance at June 30, 2019 | 45,640 | $ 436 | $ 227,249 | $ (122,506) | $ (14,181) | $ (10,668) | $ 80,330 |

**Six Months Ended June 30, 2018**

| | Number of Shares Issued | Common Stock | Additional Paid-in Capital | Accumulated Deficit | Accumulated Other Comprehensive Loss | Treasury Stock | Total Stockholders' Equity |
|---|---|---|---|---|---|---|---|
| Balance at December 31, 2017 | 42,764 | $ 419 | $ 218,792 | $ (116,967) | $ (10,676) | $ (10,668) | $ 80,900 |
| Stock option exercises | 719 | 3 | 1,983 | - | - | - | 1,986 |
| Stock purchase plan | 25 | - | (11) | - | - | - | (11) |
| Vesting of restricted stock units | 805 | 8 | - | - | - | - | 8 |
| Shares withheld for taxes | (211) | (3) | (600) | - | - | - | (603) |
| Stock compensation expense | - | - | 1,746 | - | - | - | 1,746 |
| Net loss | - | - | - | (5,528) | - | - | (5,528) |
| Other comprehensive loss | - | - | - | - | (1,486) | - | (1,486) |
| Balance at June 30, 2018 | 44,102 | $ 427 | $ 221,910 | $ (122,495) | $ (12,162) | $ (10,668) | $ 77,012 |

See accompanying notes to unaudited consolidated financial statements.

**HARVARD BIOSCIENCE, INC.**
**CONSOLIDATED STATEMENTS OF CASH FLOWS**
**(Unaudited, in thousands)**

| | Six Months Ended June 30, | |
|---|---|---|
| | **2019** | **2018** |
| Cash flows from operating activities: | | |
| Net loss | $ (2,617) | $ (5,528) |
| Adjustments to reconcile net loss to net cash provided by operating activities: | | |
| Stock compensation expense | 1,206 | 1,746 |
| Depreciation | 972 | 1,051 |
| Impairment charges | 941 | - |
| Gain on sale of Denville | - | (1,251) |
| Loss on disposal of fixed assets | - | (3) |
| Amortization of catalog costs | 10 | 14 |
| Provision for allowance for doubtful accounts | 368 | 149 |
| Amortization of intangible assets | 2,866 | 2,562 |
| Amortization of deferred financing costs | 189 | 458 |
| Deferred income taxes | (1) | (96) |
| Changes in operating assets and liabilities: | | |
| Decrease (increase) in accounts receivable | 2,681 | (993) |
| (Increase) decrease in inventories | (209) | 2,139 |
| Decrease in other receivables and other assets | 150 | 673 |
| (Decrease) increase in trade accounts payable | (1,382) | 1,798 |
| Increase in accrued income taxes | (361) | (344) |
| Decrease in accrued expenses | (1,371) | (888) |
| (Decrease) increase in deferred revenue | (288) | 2,209 |
| Decrease in other liabilities | (487) | (1,971) |
| Net cash provided by operating activities | 2,667 | 1,725 |
| | | |
| Cash flows from investing activities: | | |
| Additions to property, plant and equipment | (423) | (634) |
| Additions to catalog costs | (9) | (24) |
| Acquisition, net of cash acquired | - | (68,008) |
| Disposition, net of cash sold | 1,020 | 15,754 |
| Net cash provided by (used in) investing activities | 588 | (52,912) |
| | | |
| Cash flows from financing activities: | | |
| Proceeds from issuance of debt | 2,300 | 68,500 |
| Repayments of debt | (8,503) | (17,247) |
| Payments of debt issuance costs | - | (1,928) |
| (Net taxes paid for) net proceeds from issuance of common stock | (334) | 1,380 |
| Net cash (used in) provided by financing activities | (6,537) | 50,705 |
| | | |
| Effect of exchange rate changes on cash | 43 | 373 |
| Decrease in cash and cash equivalents | (3,239) | (109) |
| Cash and cash equivalents at the beginning of period | 8,173 | 5,733 |
| Cash and cash equivalents at the end of period | $ 4,934 | $ 5,624 |
| | | |
| Supplemental disclosures of cash flow information: | | |
| Cash paid for interest | $ 2,861 | $ 2,448 |
| Cash paid (refunded) for income taxes | $ 299 | $ (208) |

See accompanying notes to unaudited consolidated financial statements.

**HARVARD BIOSCIENCE, INC.**
**NOTES TO UNAUDITED CONSOLIDATED FINANCIAL STATEMENTS**

## 1. Basis of Presentation and Summary of Significant Accounting Policies

***Basis of Presentation***

The unaudited consolidated financial statements of Harvard Bioscience, Inc. and its wholly-owned subsidiaries (collectively, Harvard Bioscience or the Company) as of June 30, 2019 and for the three and six months ended June 30, 2019 and 2018 have been prepared by the Company pursuant to the rules and regulations of the Securities and Exchange Commission (SEC). Certain information and footnote disclosures normally included in financial statements prepared in accordance with U.S. generally accepted accounting principles (U.S. GAAP) have been condensed or omitted pursuant to such rules and regulations. The December 31, 2018 consolidated balance sheet was derived from audited financial statements, but does not include all disclosures required by U.S. GAAP. However, the Company believes that the disclosures are adequate to make the information presented not misleading. These unaudited consolidated financial statements should be read in conjunction with the consolidated financial statements and the notes thereto included in the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2018, which was filed with the SEC on March 18, 2019.

In the opinion of management, all adjustments, which include normal recurring adjustments necessary to present a fair statement of financial position as of June 30, 2019, results of operations and comprehensive income (loss) for the three and six months ended June 30, 2019 and 2018 and cash flows for the six months ended June 30, 2019 and 2018, as applicable, have been made. The results of operations for the three months ended June 30, 2019 are not necessarily indicative of the operating results for the full fiscal year or any future periods.

***Prior Period Financial Statement Correction of Immaterial Error***

During the quarter ended March 31, 2019, the Company identified an immaterial misclassification error in the Company's consolidated balance sheet as of December 31, 2018. The immaterial misclassification understated current portion, long term debt and overstated long term debt, less current installments. This misclassification, in the amount of approximately $4.0 million, related to the classification of the Company's excess cash flow payment made to its lenders during the quarter ended March 31, 2019 as long term instead of current on its consolidated balance sheet at December 31, 2018. The misclassification had no impact on total reported debt. Refer to footnote 14 for further details. The Company assessed the materiality of this error on the financial statements for prior periods in accordance with the SEC Staff Accounting Bulletin (SAB) No. 99, *Materiality*, codified in Accounting Standards Codification (ASC) 250, *Presentation of Financial Statements,* and concluded that it was not material to any prior annual or interim periods. The Company recorded an adjustment to decrease long term debt, less current installments and increase current portion, long term debt in the consolidated balance sheet at December 31, 2018 with no impact on total reported debt.

***Reclassifications***

As disclosed in Note 5, on January 22, 2018, the Company sold substantially all the assets of its operating subsidiary, Denville Scientific, Inc. (Denville). The sale of Denville represented a strategic shift that had a major effect on the Company's operations and financial results. As such and pursuant to Accounting Standards Codification (ASC) 205-20 – *Presentation of Financial Statements - Discontinued Operations*, the operating results of Denville for the three and six months ended June 30, 2018 have been presented in discontinued operations in the consolidated statements of operations. These reclassifications and adjustments had no effect on total amounts within the consolidated balance sheet, consolidated statements of operations and comprehensive income (loss), consolidated statements of cash flows for any of the periods presented.

***Summary of Significant Accounting Policies***

The accounting policies underlying the accompanying unaudited consolidated financial statements are those set forth in Note 2 to the consolidated financial statements included in the Company's Annual Report on Form 10-K for the year ended December 31, 2018, which was filed with the SEC on March 18, 2019. Except for the accounting for leases as noted below there have been no material changes in the company's significant accounting policies during the six months ended June 30, 2019.

***Leases***

The Company accounts for its leases in accordance with ASC 842 *Leases*. The Company leases office space, manufacturing facilities, automobiles and equipment. The Company concludes on whether an arrangement is a lease at inception. This determination as to whether an arrangement contains a lease is based on an assessment as to whether a contract conveys the right to the Company to control the use of identified property, plant or equipment for period of time in exchange for consideration. Leases with an initial term of 12 months or less are not recorded on the balance sheet. The Company recognizes these lease expenses on a straight line basis over the lease term.

As of June 30, 2019, the Company has assessed its contracts and concluded that its leases consist of operating leases. Operating leases are included in operating lease right-of-use (ROU) assets, current portion of operating lease liabilities, and operating lease liabilities in the Company’s consolidated balance sheets.

ROU assets represent the Company’s right to use an underlying asset for the lease term and lease liabilities represent the Company’s obligation to make lease payments arising from the lease. Operating lease ROU assets and liabilities are recognized at commencement date based on the present value of lease payments over the lease term. As most of the Company’s leases do not provide an implicit rate, the Company determines an incremental borrowing rate based on the information available at commencement date in determining the present value of lease payments. The incremental borrowing rate represents a significant judgment that is based on an analysis of the Company’s credit rating, country risk, treasury and corporate bond yields, as well as comparison to the Company’s borrowing rate on its most recent loan. The Company uses the implicit rate when readily determinable. The operating lease ROU asset also includes any lease payments made and excludes lease incentives. Lease expense for lease payments is recognized on a straight-line basis over the lease term.

The Company has lease agreements with lease and non-lease components, which are generally accounted for separately. Additionally, for its leases, the Company applies a portfolio approach to effectively account for the operating lease ROU assets and liabilities.

**2. Recently Issued Accounting Pronouncements**

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments—Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments*, which amends the impairment model by requiring entities to use a forward-looking approach based on expected losses rather than incurred losses to estimate credit losses on certain types of financial instruments, including trade receivables. This may result in the earlier recognition of allowances for losses. The ASU is effective for public entities for fiscal years beginning after December 15, 2019, with early adoption permitted. In May 2019, the FASB issued ASU No. 2019-05, *Financial Instruments – Credit Losses (Topic 326): Targeted Transition Relief*, which provided additional implementation guidance on the previously issued ASU. Management has not yet completed its assessment of the impact of the new standard on the Company’s Consolidated Financial Statements. Currently, the Company believes that the most notable impact of this ASU will relate to its processes around the assessment of the adequacy of its allowance for doubtful accounts on trade accounts receivable and the recognition of credit losses.

In August 2018, the FASB issued ASU No. 2018-14, *Disclosure Framework—Changes to the Disclosure Requirements for Defined Benefit Plans*, which amends ASC 715 to add, remove and clarify disclosure requirements related to defined benefit pension and other postretirement plans. The ASU is effective for public entities for fiscal years beginning after December 15, 2020, with early adoption permitted. Management has not yet completed its assessment of the impact of the new standard on the Company’s Consolidated Financial Statements.

In April 2019, the FASB issued ASU No. 2019-04, Codification Improvements to Topic 815, *Derivatives and Hedging*, which updates certain guidance previously issued in ASU No. 2017-12, *Derivatives and Hedging (Topic 815)*. The ASU is effective as of January 1, 2020, which is the beginning of the first annual period beginning after the issuance of the ASU for public entities that have adopted ASU No. 2017-12. Entities may elect either to retrospectively apply all amendments in the ASU or to prospectively apply all amendments as of the date of adoption of the ASU. Management has not yet completed its assessment of the impact of the new standard on the Company’s Consolidated Financial Statements.

*Recently Adopted Accounting Pronouncements*

In August 2017, the FASB issued ASU No. 2017-12, *Derivatives and Hedging (Topic 815)* which amends the hedge accounting recognition and presentation requirements in ASC 815, *Derivatives and Hedging*. The Board’s objectives in issuing the ASU are to (1) improve the transparency and understandability of information conveyed to financial statement users about an entity’s risk management activities by better aligning the entity’s financial reporting for hedging relationships with those risk management activities and (2) reduce the complexity of and simplify the application of hedge accounting by preparers. The ASU is effective for annual reporting periods, including interim periods within those annual reporting periods, beginning after December 15, 2018. The Company adopted this guidance as of January 1, 2019, and it did not have a material impact on its consolidated financial position, results of operations and cash flows.

In February 2016, the FASB issued ASU No. 2016-02, *Leases*, which is intended to improve financial reporting about leasing transactions. The update requires a lessee to record on its balance sheet the assets and liabilities for the rights and obligations created by lease terms of more than 12 months. The update is effective for fiscal years beginning after December 15, 2018. A modified retrospective transition approach is required for leases existing at, or entered into after, the beginning of the earliest comparative period presented in the financial statements, with certain practical expedients available. The Company elected to utilize a practical expedient in its method of adoption of the standard and adopted the guidance as of January 1, 2019. Under this expedient, which is a "current-period adjustment method," the Company applied ASC 842 as of January 2019 and recognized operating lease liabilities of $11.7 million and right of use assets of $9.4 million for all leases with lease terms of more than 12 months. There was no impact to retained earnings as of that date. In addition, the Company adopted the guidance by electing the following practical expedients: (1) the Company did not reassess whether any expired or existing contracts contained leases, (2) the Company did not reassess the lease classification for any expired or existing leases, and (3) the Company excluded variable payments from the lease contract consideration and recorded those as incurred. The Company's future commitments under lease obligations and additional disclosures are summarized in Note 12.

## 3. Accumulated Other Comprehensive Loss

Changes in each component of accumulated other comprehensive loss, net of tax are as follows:

| (in thousands) | Foreign currency translation adjustments | Derivatives qualifying as hedges | Defined benefit pension plans | Total |
|---|---|---|---|---|
| **Balance at December 31, 2018** | $ (12,630) | $ (170) | $ (732) | $ (13,532) |
| Other comprehensive income (loss) before reclassifications | (191) | (494) | - | (685) |
| Amounts reclassified from AOCI | - | 36 | - | 36 |
| Other comprehensive income (loss) | (191) | (458) | - | (649) |
| **Balance at June 30, 2019** | $ (12,821) | $ (628) | $ (732) | $ (14,181) |

## 4. Acquisition

On January 31, 2018, the Company acquired all of the issued and outstanding shares of Data Sciences International, Inc. (DSI), a Delaware corporation, for approximately $71.1 million. The Company funded the acquisition from its existing cash balances, excess proceeds from the Denville Transaction discussed in Note 5, and proceeds from the Financing Agreement discussed in Note 14.

DSI, a St. Paul, Minnesota-based life science research company, is a recognized leader in physiologic monitoring focused on delivering preclinical products, systems, services and solutions to its customers. Its customers include pharmaceutical and biotechnology companies, as well as contract research organizations, academic labs and government researchers. This acquisition diversifies the Company's customer base into the biopharmaceutical and contract research organization markets.

The aggregate purchase price for this acquisition was allocated to tangible and intangible net assets acquired as follows:

| | (in thousands) |
|---|---|
| Tangible assets | $ 34,010 |
| Liabilities assumed | (11,949) |
| Net assets | 22,061 |
| | |
| Goodwill and intangible assets: | |
| Goodwill | 21,865 |
| Amortizable intangible assets: | |
| Trade name | 3,524 |
| Developed technology | 25,570 |
| Customer relationships | 9,837 |
| In-process research and development | 1,387 |
| Total amortizable intangible assets | 40,318 |
| Deferred tax liabilities, net | (13,120) |
| Total goodwill and intangible assets, net of tax | 49,063 |
| Acquisition purchase price | $ 71,124 |

Tangible assets and liabilities assumed, as referenced above, consisted of the following:

| | |
|---|---|
| Cash acquired | $ 2,576 |
| Accounts receivable, net | 5,069 |
| Inventories | 11,512 |
| Other current assets | 810 |
| Property, plant and equipment, net | 3,574 |
| Deferred income tax assets, net | 10,469 |
| Tangible assets | $ 34,010 |
| | |
| Accounts payable and accrued liabilities | $ 6,001 |
| Deferred revenue including customer advances | 2,976 |
| Other long term liabilities | 2,972 |
| Liabilities assumed | $ 11,949 |

The Company finalized the purchase price allocation for DSI as of December 31, 2018. The weighted-average amortization periods for definite-lived intangible assets acquired was 9.4 years for tradenames, 8.2 years for developed technology, 12.4 years for customer relationships and 7.4 years for in-process research and development assets. The weighted average amortization period for all definite-lived intangible assets acquired was 9.3 years. Goodwill recorded as a result of the acquisition of DSI is not deductible for tax purposes.

The results of operations for DSI have been included in the Company’s consolidated financial statements from the date of acquisition. The revenues of DSI included in the Company’s consolidated statement of operations from the date of acquisition to June 30, 2018 were approximately $18.2 million. The net loss of DSI included in the Company’s consolidated statement of operations for the same period was approximately $1.7 million. Included in the net loss for the six months ended June 30, 2018 was a $3.7 million charge recognized in cost of revenues related to purchase accounting inventory fair value step up amortization. The total inventory fair value step up was valued at $3.8 million and was recognized into cost of revenues over one inventory turn, or approximately five and a half months. Also included in the net loss of DSI for that period was $1.8 million of intangible asset amortization expense.

The following consolidated pro forma information is based on the assumption that was used at the time of the acquisition of DSI. Accordingly, the historical results have been adjusted to reflect amortization expense, interest expense and other purchase accounting adjustments that would have been recognized on such a pro forma basis. The pro forma information is presented for comparative purposes only and is not necessarily indicative of the financial position or results of operations which would have been reported had the Company completed the acquisition during these periods or which might be reported in the future.

| Pro Forma | Six Months Ended June 30, 2018 (in thousands) |
|---|---|
| Revenues | $ 61,671 |
| Income (loss) from continuing operations | (392) |

Direct acquisition costs recorded in other expense, net in the Company's consolidated statements of operations were $2.6 million for the six months ended June 30, 2018.

## 5. Discontinued Operations

On January 22, 2018, the Company sold substantially all the assets of its wholly-owned subsidiary, Denville, for approximately $20.0 million, which included a $3.0 million earn-out provision (the Denville Transaction). Upon the closing of the transaction, the Company received $15.7 million. The $3.0 million earn-out provision represented consideration that was contingent on Denville achieving certain performance metrics with respect to 2018 and 2019 (with potential consideration of $2.0 million based on Denville's performance in 2018, and $1.0 million based on Denville's performance in 2019). During the three months ended June 30, 2019, it was determined that the first potential earn-out consideration amount of $2.0 million for 2018 was not earned, and therefore the maximum the Company may potentially receive of the original $3.0 million earn-out provision is now $1.0 million, which, as described above, is contingent on Denville achieving certain performance metrics.

The following table is a reconciliation of the major line items of income from discontinued operations presented within the Company's consolidated statements of operations for the three and six months ended June 30, 2018.

| | Three Months Ended June 30, 2018 | Six Months Ended June 30, 2018 |
|---|---|---|
| | (in thousands) | |
| Revenues | $ - | $ 893 |
| Cost of revenues | - | (534) |
| Operating and other expenses | - | (673) |
| Gain on disposal of discontinued operations | 24 | 1,251 |
| Income from discontinued operations before income taxes | 24 | 937 |
| Income tax benefit | (10) | (883) |
| Income from discontinued operations | $ 34 | $ 1,820 |

During the three months ended June 30, 2019, the Company received a release of an escrow amount of $1.0 million related to the Denville Transaction, which is included in the investing cash flows for disposition in the Company's consolidated statements of cash flows for the six months ended June 30, 2019. Total operating cash flows for Denville in the Company's consolidated statements of cash flows for the six months ended June 30, 2018, were immaterial.

## 6. Goodwill and Other Intangible Assets

Intangible assets consist of the following:

| | June 30, 2019 | | December 31, 2018 | | Weighted Average Life | (a) |
|---|---|---|---|---|---|---|
| | (in thousands) | | | | | |
| Amortizable intangible assets: | Gross | Accumulated Amortization | Gross | Accumulated Amortization | | |
| Existing technology | $ 41,205 | $ (18,004) | $ 41,268 | $ (16,215) | 6.6 | Years |
| Trade names | 7,809 | (3,182) | 7,828 | (2,861) | 7.2 | Years |
| Distribution agreements/customer relationships | 22,603 | (10,147) | 22,657 | (9,509) | 10.2 | Years |
| In-process research and development | 446 | (60) | 1,387 | (30) | 6.4 | Years |
| Patents | 211 | (211) | 211 | (204) | - | Years |
| Total amortizable intangible assets | 72,274 | $ (31,604) | 73,351 | $ (28,819) | | |
| | | | | | | |
| Indefinite-lived intangible assets: | | | | | | |
| Goodwill | 57,239 | | 57,304 | | | |
| Other indefinite-lived intangible assets | 1,230 | | 1,232 | | | |
| Total goodwill and other indefinite-lived intangible assets | 58,469 | | 58,536 | | | |
| | | | | | | |
| Total intangible assets, gross | $ 130,743 | | $ 131,887 | | | |

(a) Weighted average life as of June 30, 2019.

The change in the carrying amount of goodwill for the six months ended June 30, 2019 is as follows:

| | (in thousands) |
|---|---|
| Balance at December 31, 2018 | $ 57,304 |
| Effect of change in currency translation | (65) |
| Balance at June 30, 2019 | $ 57,239 |

Intangible asset amortization expense from continuing operations was $1.4 million for the three months ended June 30, 2019 and 2018, respectively. Intangible asset amortization expense from continuing operations was $2.9 million and $2.5 million for the six months ended June 30, 2019 and 2018, respectively. Amortization expense of existing amortizable intangible assets is currently estimated to be $5.6 million for the year ending December 31, 2019, $5.6 million for the year ending December 31, 2020, $5.6 million for the year ending December 31, 2021, $5.5 million for the year ending December 31, 2022, $5.4 million for the year ending December 31, 2023, and $5.3 million for the year ending December 31, 2024.

During the three months ended June 30, 2019, the Company recognized an impairment charge of $0.9 million related to certain of its in-process research and development intangible assets as a result of the on-going evaluation of its capitalized research and development activities. There was no impairment charge recognized during the three and six months ended June 30, 2018.

## 7. Inventories

Inventories consist of the following:

| | June 30, 2019 | December 31, 2018 |
|---|---|---|
| | (in thousands) | |
| Finished goods | $ 6,729 | $ 6,936 |
| Work in process | 4,101 | 3,667 |
| Raw materials | 14,458 | 14,484 |
| Total | $ 25,288 | $ 25,087 |

**8. Property, Plant and Equipment**

As of June 30, 2019 and December 31, 2018, property, plant and equipment consist of the following:

| | June 30, 2019 | December 31, 2018 |
|---|---|---|
| | (in thousands) | |
| Land, buildings and leasehold improvements | $ 2,527 | $ 2,468 |
| Machinery and equipment | 9,914 | 9,678 |
| Computer equipment and software | 9,814 | 9,685 |
| Furniture and fixtures | 1,406 | 1,390 |
| Automobiles | 114 | 115 |
| | 23,775 | 23,336 |
| Less: accumulated depreciation | (18,416) | (17,438) |
| Property, plant and equipment, net | $ 5,359 | $ 5,898 |

**9. Related Party Transactions**

As part of the acquisitions of Multi Channel Systems MCS GmbH (MCS) and Triangle BioSystems, Inc. (TBSI) in 2014, the Company signed lease agreements with the former owners of these acquired companies. The principals of such former owners of MCS and TBSI were employees of the Company as of June 30, 2019 and 2018. Pursuant to these lease agreements, the Company made rent payments of approximately $89 thousand and $81 thousand to these former owners for the three months ended June 30, 2019 and 2018, respectively. The Company made rent payments of approximately $178 thousand and $171 thousand to these former owners for the six months ended June 30, 2019 and 2018, respectively.

**10. Warranties**

Warranties are estimated and accrued at the time revenues are recorded. A rollforward of the Company's product warranty accrual is as follows:

| | Beginning Balance | (Payments)\ Credits | Additions | Ending Balance |
|---|---|---|---|---|
| | (in thousands) | | | |
| Year ended December 31, 2018 | $ 246 | (37) | 182 | $ 391 |
| Six months ended June 30, 2019 | $ 391 | (79) | 6 | $ 318 |

**11. Employee Benefit Plans**

The Company's subsidiary in the United Kingdom, Biochrom Limited, maintains contributory, defined benefit pension plans for substantially all of its employees. These defined benefit pension plans have been closed to new employees since 2014, as well as closed to the future accrual of benefits for existing employees. The components of the Company's defined benefit pension expense were as follows:

| | Three Months Ended June 30, | | Six Months Ended June 30, | |
|---|---|---|---|---|
| | 2019 | 2018 | 2019 | 2018 |
| | (in thousands) | | | |
| Components of net periodic benefit cost: | | | | |
| Interest cost | $ 123 | $ 118 | $ 255 | $ 250 |
| Expected return on plan assets | (170) | (184) | (352) | (388) |
| Net amortization loss | 71 | 52 | 147 | 110 |
| Net periodic benefit cost (income) | $ 24 | $ (14) | $ 50 | $ (28) |

For the three months ended June 30, 2019 and 2018, the Company contributed $0.2 million, for both periods, to its defined benefit pension plans. For the six months ended June 30, 2019 and 2018, the Company contributed $0.4 million and $0.4 million, respectively to its defined benefit pension plans. The Company expects to contribute approximately $0.3 million to its defined benefit pension plans during the remainder of 2019.

The Company had an underfunded pension liability of approximately $0.9 million as of June 30, 2019 and December 31, 2018 included in the other long term liabilities line item in the consolidated balance sheets.

## 12. Leases

The Company has noncancelable operating leases for office, manufacturing facilities, warehouse space, automobiles and equipment expiring at various dates through 2023 and thereafter. As discussed in Footnote 1, the Company adopted ASC 842 as of January 1, 2019, using a current period adjustment method. In accordance with this method, the Company recognized a right of use asset of $9.4 million and an operating lease liability of $11.7 million as of January 1, 2019. As a result of using the current period adjustment method, the lease expense for six months ended June 30, 2019 and 2018 was recognized under ASC 842, and ASC 840, the previous standard, respectively.

The components of lease expense for the three and six months ended June 30, 2019 are as follows:

| | **Three Months Ended June 30, 2019** | **Six Months Ended June 30, 2019** |
|---|---|---|
| | (in thousands) | (in thousands) |
| Operating lease cost | $ 515 | $ 1,038 |
| Short term lease cost | 51 | 127 |
| Sublease income | (103) | (205) |
| Total lease cost | $ 463 | $ 960 |

Supplemental cash flow information related to the Company's operating leases was as follows

| | **Six Months Ended June 30, 2019** |
|---|---|
| | (in thousands) |
| Cash paid for amounts included in the measurement of lease liabilities | |
| Operating cash flows from operating leases | $ 1,367 |
| | |
| Right-of-use assets obtained in exchange for lease obligations | |
| Operating leases | $ - |

Supplemental balance sheet information related to the Company's operating leases was as follows:

| | **June 30, 2019** | |
|---|---|---|
| | (in thousands) | |
| Operating lease right-of use assets | $ 8,846 | |
| | | |
| Current portion, operating lease liabilities | $ 2,295 | |
| Operating lease liabilities, long term | 8,714 | |
| Total operating lease liabilities | $ 11,009 | |
| | | |
| Weighted average remaining lease term | 8.5 | years |
| Weighted average discount rate | 9.2% | |

Rent payments for continuing operations were approximately $1.4 million for the six months ended June 30, 2018. Future minimum lease payments for operating leases, with initial or remaining terms in excess of one year at June 30, 2019, are as follows:

| | Operating Leases |
|---|---|
| | (in thousands) |
| 2020 | $ 2,295 |
| 2021 | 2,108 |
| 2022 | 1,852 |
| 2023 | 1,804 |
| 2024 | 1,798 |
| Thereafter | 6,543 |
| Total lease payments | 16,400 |
| Less interest | (5,391) |
| Total operating lease liabilities | $ 11,009 |

## 13. Capital Stock

*Common Stock*

The Company has 80.0 million shares of common stock authorized for issuance. As of June 30, 2019, the Company had 37.9 million shares of common stock issued and outstanding.

*Preferred Stock*

The Company's Board of Directors has the authority to issue up to 5.0 million shares of preferred stock and to determine the price, privileges and other terms of the shares. The Board of Directors may exercise this authority without any further approval of stockholders. As of June 30, 2019, the Company had no preferred stock issued or outstanding.

*Employee Stock Purchase Plan (as amended, the ESPP)*

In 2000, the Company approved the ESPP. Under this ESPP, participating employees can authorize the Company to withhold a portion of their base pay during consecutive six-month payment periods for the purchase of shares of the Company's common stock. At the conclusion of the period, participating employees can purchase shares of the Company's common stock at 85% of the lower of the fair market value of the Company's common stock at the beginning or end of the period. Shares are issued under the ESPP for the six-month periods ending June 30 and December 31. As of June 30, 2019, 1,400,000 shares of common stock are authorized for issuance, of which 984,547 shares were issued. There were 93,785 and 24,907 shares issued under the ESPP during the six months ended June 30, 2019 and 2018, respectively.

*Stock Option and Equity Incentive Plans*

*Third Amended and Restated 2000 Stock Option and Incentive Plan (as amended, the Third A&R Plan)*

The Third Amendment to the Third A&R Plan (the Amendment) was adopted by the Board of Directors on April 2, 2018. Such Amendment was approved by the stockholders at the Company's 2018 Annual Meeting of Stockholders. Pursuant to the Amendment, the aggregate number of shares authorized for issuance under the Third A&R Plan was increased by 3,400,000 shares to 20,908,929.

*Restricted Stock Units with a Market Condition (the Market Condition RSUs)*

On May 24, 2018, the Compensation Committee of the Board of Directors of the Company approved and granted deferred stock awards of Market Condition RSUs (the 2018 Market Condition RSUs) to certain members of the Company's management team under the Third A&R Plan. The vesting of the 2018 Market Condition RSUs is based on a graded-vesting schedule (one third at the end of each year for three years) and linked to the achievement of a relative total shareholder return of the Company's common stock from May 24, 2018 to the earlier of (i) May 24, 2019 or (ii) upon a change of control (measured relative to the NASDAQ Biotechnology index and based on the 20-day trading average price before each such date). As of June 30, 2019, the target number of these restricted stock units that may be earned is 7,556 shares; the maximum amount is 150% of the target number.

On March 7, 2019, the Compensation Committee of the Board of Directors of the Company approved and granted deferred stock awards of Market Condition RSUs (the 2019 Market Condition RSUs) to certain members of the Company's management team under the Third A&R Plan. The vesting of the 2019 Market Condition RSUs is based on a graded-vesting schedule (one third at the end of each year for three years) and linked to the achievement of a relative total shareholder return of the Company's common stock from March 7, 2019 to the earlier of (i) March 7, 2020 or (ii) upon a change of control (measured relative to the NASDAQ Biotechnology index and based on the 20-day trading average price before each such date). As of June 30, 2019, the target number of these restricted stock units that may be earned is 56,517 shares; the maximum amount is 150% of the target number.

*Stock-Based Payment Awards*

The Company accounts for stock-based payment awards in accordance with the provisions of FASB ASC 718, which requires it to recognize compensation expense for all stock-based payment awards made to employees and directors including stock options, restricted stock units, Market Condition RSUs and employee stock purchases related to the ESPP. The Company has elected as an accounting policy to account for forfeitures for service based awards as they occur, with no adjustment for estimated forfeitures.

Stock option and restricted stock unit activity under the Company's Third A&R Plan for the six months ended June 30, 2019 was as follows:

| | **Stock Options** | | **Restricted Stock Units** | | **Market Condition RSU's** | |
|---|---|---|---|---|---|---|
| | **Stock Options Outstanding** | **Weighted Average Exercise Price** | **Restricted Stock Units Outstanding** | **Grant Date Fair Value** | **Market Condition RSU's Outstanding** | **Grant Date Fair Value** |
| Balance at December 31, 2018 | 1,956,732 | $ 4.25 | 1,233,762 | $ 3.36 | 116,944 | $ 4.19 |
| Granted | 587,909 | 3.73 | 599,977 | 3.19 | 75,514 | 4.16 |
| Exercised | (2,500) | 3.25 | - | - | - | - |
| Expired | (2,635) | 2.28 | - | - | - | - |
| Vested (RSUs) | - | - | (550,200) | 3.46 | (3,778) | 4.19 |
| Cancelled / forfeited | (356,649) | 4.03 | (229,883) | 3.48 | (124,607) | 4.19 |
| Balance at June 30, 2019 | 2,182,857 | $ 4.15 | 1,053,656 | $ 3.19 | 64,073 | $ 4.16 |

The weighted average fair value of the options granted under the Third A&R Plan during the three months ended June 30, 2019 and 2018 was $0.97 and $1.81, respectively, and during the six months ended June 30, 2019 and 2018 was $1.56 and $1.81, respectively. The following assumptions were used to estimate the fair value, using the Black-Scholes option pricing model, of stock options granted during the three and six months ended June 30, 2019:

| | **Three Months Ended June 30,** | | **Six Months Ended June 30,** | |
|---|---|---|---|---|
| | **2019** | **2018** | **2019** | **2018** |
| Volatility | 47.76 % | 42.31 % | 45.69 % | 42.31 % |
| Risk-free interest rate | 1.86 % | 2.82 % | 2.42 % | 2.82 % |
| Expected holding period (in years) | 4.70 years | 4.95 years | 4.73 years | 4.95 years |
| Dividend yield | - % | - % | - % | - % |

The weighted average fair value of the 2019 Market Condition RSUs which were granted under the Third A&R Plan during the three months ended March 31, 2019 was $4.16. There were no Market Condition RSUs granted under the Third A&R Plan during the three months ended June 30, 2019. The weighted average fair value of the 2018 Market Condition RSUs which were granted under the Third A&R Plan during the three months ended June 30, 2018 was $4.19. There were no Market Condition RSUs granted under the Third A&R Plan during the three months ended March 31, 2018. The following assumptions were used to estimate the fair value, using a Monte-Carlo valuation simulation, of the Market Condition RSUs granted during the six months ended June 30, 2019 and 2018:

| | Six Months Ended June 30, | |
|---|---|---|
| | 2019 | 2018 |
| Volatility | 48.00% | 44.02% |
| Risk-free interest rate | 2.50% | 2.27% |
| Correlation coefficient | 0.27% | 0.07% |
| Dividend yield | -% | -% |

The Company used historical volatility to calculate the expected volatility for each grant as of the grant date. Historical volatility was determined by calculating the mean reversion of the daily adjusted closing stock price. The risk-free interest rate assumption is based upon observed U.S. Treasury bill interest rates (risk-free) appropriate for the term of the Company's stock options and Market Condition RSUs. The expected holding period of stock options represents the period of time options are expected to be outstanding and is based on historical experience. The vesting period ranges from one to four years and the contractual life is ten years. The correlation coefficient, used to value the Market Condition RSUs, represents the way in which entities move in relation to the NASDAQ Biotechnology index as a whole.

Stock-based compensation expense related to stock options, restricted stock units, Market Condition RSUs and the ESPP for the three and six months ended June 30, 2019 and 2018 was allocated as follows:

| | Three Months Ended June 30, | | Six Months Ended June 30, | |
|---|---|---|---|---|
| | 2019 | 2018 | 2019 | 2018 |
| | (in thousands) | | | |
| Cost of revenues | $ 8 | $ 15 | $ 21 | $ 26 |
| Sales and marketing | 36 | 102 | 29 | 226 |
| General and administrative | 529 | 576 | 1,080 | 1,273 |
| Research and development | 42 | 41 | 76 | 71 |
| Discontinued operations | - | - | - | 150 |
| Total stock-based compensation | $ 615 | $ 734 | $ 1,206 | $ 1,746 |

The Company did not capitalize any stock-based compensation.

*Earnings per share*

Basic earnings per share is based upon net income divided by the number of weighted average common shares outstanding during the period. The calculation of diluted earnings per share assumes conversion of stock options, restricted stock units and Market Condition RSUs into common stock using the treasury method. The weighted average number of shares used to compute basic and diluted earnings per share consists of the following:

| | Three Months Ended June 30, | | Six Months Ended June 30, | |
|---|---|---|---|---|
| | 2019 | 2018 | 2019 | 2018 |
| Basic | 37,735,717 | 36,082,258 | 37,682,539 | 35,774,334 |
| Effect of assumed conversion of employee and director stock options, restricted stock units and Market Condition RSUs | - | - | - | - |
| Diluted | 37,735,717 | 36,082,258 | 37,682,539 | 35,774,334 |

Excluded from the shares used in calculating the diluted earnings per common share in the above table are options, restricted stock units and Market Condition RSUs of approximately 3,300,586 and 4,737,057 shares of common stock for the six months ended June 30, 2019 and 2018, respectively, as the impact of these shares would be anti-dilutive.

**14. Long Term Debt**

On January 22, 2018, in connection with the closing of the Denville Transaction, the Company terminated the Third Amended and Restated Credit Agreement (the Credit Agreement), among the Company, Brown Brothers Harriman & Co. and each of the other lenders party thereto, and Bank of America, as administrative agent. All outstanding amounts under the agreement were repaid in full using a portion of the proceeds of the Denville Transaction. At the time of repayment, there was approximately $11.9 million outstanding.

On January 31, 2018, the Company entered into a financing agreement by and among the Company and certain subsidiaries of the Company parties thereto, as borrowers (collectively, the Borrower), certain subsidiaries of the Company parties thereto, as guarantors, various lenders from time to time party thereto (the Lenders), and Cerberus Business Finance, LLC, as collateral agent and administrative agent for the Lenders (the Financing Agreement). On August 16, 2018, the Company and Cerberus Business Finance, LLC entered into a First Amendment to the Financing Agreement, which such amendment modified certain provisions related to the borrowing base and reporting, among other things.

The Financing Agreement provided for senior secured credit facilities (the Senior Secured Credit Facilities) comprised of a $64.0 million term loan and up to a $25.0 million revolving line of credit. The proceeds of the term loan and $4.8 million of advances under the revolving line of credit were used to fund a portion of the DSI acquisition, and to pay fees and expenses related thereto and the closing of the Senior Secured Credit Facilities. In addition, the revolving facility is available for use by the Company and its subsidiaries for general corporate and working capital needs, and other purposes to the extent permitted by the Financing Agreement. The Senior Secured Credit Facilities have a maturity of five years.

Commencing on March 31, 2018, the outstanding term loans began to amortize in equal quarterly installments equal to $0.4 million per quarter on such date and during each of the next three quarters thereafter, $0.6 million per quarter during the next four quarters thereafter and $0.8 million per quarter thereafter, with a balloon payment at maturity. Furthermore, within ten days of the Company's delivery of its audited annual financial statements each year, the term loans are permanently reduced pursuant to certain mandatory prepayment events including an annual "excess cash flow sweep" of 50% of the consolidated excess cash flow; provided that, in any fiscal year, any voluntary prepayments of the term loans shall be credited against the Company's "excess cash flow" prepayment obligations on a dollar-for-dollar basis for such fiscal year. During the three months ended March 31, 2019, the Company made an excess cash flow payment of $4.0 million as required by the Financing Agreement. Additionally, during the three months ended June 30, 2019, the Company made a payment, as required by the Financing Agreement, of $1.0 million in connection with the release of an escrow amount associated with the Denville Transaction discussed in Note 5.

The obligations of the Borrower under the Senior Secured Credit Facilities are unconditionally guaranteed by the Company and certain of the Company's existing and subsequently acquired or organized subsidiaries. The Senior Secured Credit Facilities and related guarantees are secured on a first-priority basis (subject to certain liens permitted under the Financing Agreement) by a lien on substantially all the tangible and intangible assets of the Borrower and the subsidiary guarantors, including all of the capital stock held by such obligors (subject to a 65% limitation on pledges of capital stock of foreign subsidiaries), subject to certain exceptions.

Interest on all loans under the Senior Secured Credit Facilities is paid monthly. Borrowings under the Financing Agreement accrue interest at a per annum rate equal to, at the Borrower's option, a base rate plus 4.75% or a London Interbank Offered Rate (LIBOR) rate plus 6.25%. The loans are also subject to a 1.25% interest rate floor for LIBOR loans and a 4.25% interest rate floor for base rate loans.

The Financing Agreement contains customary representations and warranties and affirmative covenants applicable to the Company and its subsidiaries and also contains certain restrictive covenants, including, among others, limitations on the incurrence of additional debt, liens on property, acquisitions and investments, loans and guarantees, mergers, consolidations, liquidations and dissolutions, asset sales, dividends and other payments in respect of the Company's capital stock, prepayments of certain debt, transactions with affiliates and modifications of organizational documents, material contracts, affiliated practice agreements and certain debt agreements. The Financing Agreement also contains customary events of default. As of June 30, 2019, the Company was in compliance with all financial covenants contained in the Financing Agreement, was subject to covenant and working capital borrowing restrictions and had available borrowing capacity under its Financing Agreement of $9.5 million.

As of June 30, 2019, the weighted effective interest rate, net of the impact of the Company's interest rate swap, on its term loan was 8.85%. The carrying value of the debt approximates fair value because the interest rate under the obligation approximates market rates of interest available to the Company for similar instruments.

As of June 30, 2019 and December 31, 2018, the Company's borrowings were comprised of:

| | June 30, 2019 | December 31, 2018 |
|---|---|---|
| | (in thousands) | |
| Long-term debt: | | |
| Term loan | $ 56,197 | $ 62,400 |
| Total unamortized deferred financing costs | (1,376) | (1,605) |
| Total debt | 54,821 | 60,795 |
| Less: current installments | (2,800) | (6,383) |
| Current unamortized deferred financing costs | 393 | 401 |
| Long-term debt | $ 52,414 | $ 54,813 |

**15. Derivatives**

The Company uses interest-rate-related derivative instruments to manage its exposure related to changes in interest rates on its variable-rate debt instruments. The Company does not enter into derivative instruments for any purpose other than cash flow hedging. The Company does not speculate using derivative instruments.

By using derivative financial instruments to hedge exposures to changes in interest rates, the Company exposes itself to credit risk and market risk. Credit risk is the failure of the counterparty to perform under the terms of the derivative contract. When the fair value of a derivative contract is positive, the counterparty owes the Company, which creates credit risk for the Company. When the fair value of a derivative contract is negative, the Company owes the counterparty and, therefore, the Company is not exposed to the counterparty's credit risk in those circumstances. The Company minimizes counterparty credit risk in derivative instruments by entering into transactions with carefully selected major financial institutions based upon their credit profile.

Market risk is the adverse effect on the value of a derivative instrument that results from a change in interest rates. The market risk associated with interest-rate contracts is managed by establishing and monitoring parameters that limit the types and degree of market risk that may be undertaken.

The Company assesses interest rate risk by continually identifying and monitoring changes in interest rate exposures that may adversely impact expected future cash flows and by evaluating hedging opportunities. The Company maintains risk management control systems to monitor interest rate risk attributable to both the Company's outstanding or forecasted debt obligations as well as the Company's offsetting hedge positions. The risk management control systems involve the use of analytical techniques, including cash flow sensitivity analysis, to estimate the expected impact of changes in interest rates on the Company's future cash flows.

The Company uses variable-rate LIBOR debt to finance its operations. The debt obligations expose the Company to variability in interest payments due to changes in interest rates. Management believes that it is prudent to limit the variability of a portion of its interest payments. To meet this objective, management enters into LIBOR based interest rate swap agreements to manage fluctuations in cash flows resulting from changes in the benchmark interest rate of LIBOR. These swaps change the variable-rate cash flow exposure on the debt obligations to fixed cash flows. Under the terms of the interest rate swaps, the Company receives LIBOR based variable interest rate payments and makes fixed interest rate payments, thereby creating the equivalent of fixed-rate debt for the notional amount of its debt hedged.

As disclosed in Note 14, on January 31, 2018, the Company entered into a Financing Agreement comprised of a $64.0 million term loan and up to a $25.0 million revolving line of credit. Shortly after entering into the Financing Agreement, the Company entered into an interest rate swap contract with PNC Bank with a notional amount of $36.0 million and a termination date of January 1, 2023 in order to hedge the risk of changes in the effective benchmark interest rate (LIBOR) associated with the Company's Term Loan. The swap contract converted specific variable-rate debt into fixed-rate debt and fixed the LIBOR rate associated with a portion of the term loan under the Financing Agreement at 2.72%. The interest rate swap was designated as a cash flow hedge instrument in accordance with ASC 815 "Derivatives and Hedging".

The following table presents the notional amount and fair value of the Company's derivative instruments as of June 30, 2019 and December 31, 2018:

| Derivatives designated as hedging instruments under ASC 815 | Balance sheet classification | June 30, 2019 Notional Amount | June 30, 2019 Fair Value (a) |
|---|---|---|---|
| | | (in thousands) | |
| Interest rate swaps | Other assets (long term liabilities) | $ 31,591 | $ (628) |

| Derivatives designated as hedging instruments under ASC 815 | Balance sheet classification | December 31, 2018 Notional Amount | December 31, 2018 Fair Value (a) |
|---|---|---|---|
| | | (in thousands) | |
| Interest rate swaps | Other assets (long term liabilities) | $ 34,090 | $ (170) |

(a) See Note 16 for the fair value measurements related to these financial instruments.

All of the Company's derivative instruments are designated as hedging instruments. The Company has structured its interest rate swap agreements to be 100% effective and as a result, there was no impact to earnings resulting from hedge ineffectiveness. Changes in the fair value of interest rate swaps designated as hedging instruments that effectively offset the variability of cash flows associated with variable-rate, long-term debt obligations are reported in accumulated other comprehensive income (AOCI). These amounts subsequently are reclassified into interest expense as a yield adjustment of the hedged interest payments in the same period in which the related interest affects earnings. The Company's interest rate swap agreement was deemed to be fully effective in accordance with ASC 815, and, as such, unrealized gains and losses related to these derivatives were recorded as AOCI.

The following table summarizes the effect of derivatives designated as cash flow hedging instruments and their classification within comprehensive loss for the three and six months ended June 30, 2019 and 2018:

| Derivatives in Hedging Relationships | Amount of gain (loss) recognized in OCI on derivative (effective portion) | | | |
|---|---|---|---|---|
| | Three months ended June 30, | | Six Months Ended June 30, | |
| | 2019 | 2018 | 2019 | 2018 |
| | (in thousands) | | | |
| Interest rate swaps | $ (298) | $ 155 | $ (494) | $ (99) |

The following table summarizes the reclassifications out of accumulated other comprehensive loss for the three and six months ended June 30, 2019 and 2018:

| Details about AOCI Components | Amount reclassified from AOCI into income (effective portion) | | | | Location of amount reclassified from AOCI into income (effective portion) |
|---|---|---|---|---|---|
| | Three Months Ended June 30, | | Six Months Ended June 30, | | |
| | 2019 | 2018 | 2019 | 2018 | |
| | (in thousands) | | | | |
| Interest rate swaps | $ 19 | $ 70 | $ 36 | $ 45 | Interest expense |

As of June 30, 2019, $0.2 million of deferred losses on derivative instruments accumulated in AOCI are expected to be reclassified to earnings during the next twelve months. Transactions and events expected to occur over the next twelve months that will necessitate reclassifying these derivatives' losses to earnings include the repricing of variable-rate debt.

**16. Fair Value Measurements**

Fair value measurement is defined as the price that would be received to sell an asset or paid to transfer a liability in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants at the measurement date. A fair value hierarchy is established, which prioritizes the inputs used in measuring fair value into three broad levels as follows:

Level 1—Quoted prices in active markets for identical assets or liabilities.
Level 2—Inputs, other than the quoted prices in active markets, that are observable either directly or indirectly.
Level 3—Unobservable inputs based on the Company's own assumptions.

The following tables present the fair value hierarchy for those assets or liabilities measured at fair value on a recurring basis:

| | Fair Value as of June 30, 2019 | | | |
|---|---|---|---|---|
| (In thousands) | Level 1 | Level 2 | Level 3 | Total |
| Assets (Liabilities): | | | | |
| Interest rate swap agreements | $ - | $ (628) | $ - | $ (628) |

| | Fair Value as of December 31, 2018 | | | |
|---|---|---|---|---|
| (In thousands) | Level 1 | Level 2 | Level 3 | Total |
| Assets (Liabilities): | | | | |
| Interest rate swap agreements | $ - | $ (170) | $ - | $ (170) |

The Company uses the market approach technique to value its financial liabilities. The Company's financial assets and liabilities carried at fair value include derivative instruments used to hedge the Company's interest rate risks. The fair value of the Company's interest rate swap agreements was based on LIBOR yield curves at the reporting date.

## 17. Revenues

The following table represents a disaggregation of revenue from contracts with customers. Revenue from continuing operations originating from the following geographic areas for the six months ended June 30, 2019 and 2018 consist of:

| | Three Months Ended June 30, 2019 (in thousands) | | | | |
|---|---|---|---|---|---|
| | United States | United Kingdom | Germany | Rest of the world | Total |
| Instruments, equipment, software and accessories | $ 20,920 | $ 2,399 | $ 3,271 | $ 1,753 | $ 28,343 |
| Service, maintenance and warranty contracts | 910 | 236 | 79 | 16 | 1,241 |
| Total revenues | $ 21,830 | $ 2,635 | $ 3,350 | $ 1,769 | $ 29,584 |

| | Three Months Ended June 30, 2018 (in thousands) | | | | |
|---|---|---|---|---|---|
| | United States | United Kingdom | Germany | Rest of the world | Total |
| Instruments, equipment, software and accessories | $ 20,478 | $ 4,058 | $ 3,316 | $ 2,156 | $ 30,008 |
| Service, maintenance and warranty contracts | 1,204 | 168 | 129 | 13 | 1,514 |
| Total revenues | $ 21,682 | $ 4,226 | $ 3,445 | $ 2,169 | $ 31,522 |

| | Six Months Ended June 30, 2019 (in thousands) | | | | |
|---|---|---|---|---|---|
| | United States | United Kingdom | Germany | Rest of the world | Total |
| Instruments, equipment and accessories | $ 39,591 | $ 5,528 | $ 6,184 | $ 3,798 | $ 55,101 |
| Service, maintenance and warranty contracts | 2,053 | 426 | 176 | 30 | 2,685 |
| Total revenues | $ 41,644 | $ 5,954 | $ 6,360 | $ 3,828 | $ 57,786 |

| | Six Months Ended June 30, 2018 (in thousands) | | | | |
|---|---|---|---|---|---|
| | United States | United Kingdom | Germany | Rest of the world | Total |
| Instruments, equipment and accessories | $ 36,695 | $ 7,587 | $ 7,006 | $ 4,400 | $ 55,688 |
| Service, maintenance and warranty contracts | 2,030 | 334 | 198 | 31 | 2,593 |
| Total revenues | $ 38,725 | $ 7,921 | $ 7,204 | $ 4,431 | $ 58,281 |

***Deferred revenue***

As of June 30, 2019 and December 31, 2018, the Company had approximately $3.5 million and $3.8 million, respectively, in deferred revenue comprised of revenue deferred from service contracts and revenue deferred from advance payments.

Table of Contents

Changes in deferred revenue from service contracts and advance payments from customers during the six months ended June 30, 2019 and 2018 were as follows:

| | **Three Months Ended June 30, 2019** (in thousands) | | |
|---|---|---|---|
| | Service Contracts | Customer Advances | Total |
| Balance at March 31, 2019 | $ 1,666 | $ 2,049 | $ 3,715 |
| Deferral of revenue | 281 | 140 | 421 |
| Recognition of deferred revenue | (344) | (250) | (594) |
| Effect of foreign currency translation | (10) | - | (10) |
| Balance at June 30, 2019 | $ 1,593 | $ 1,939 | $ 3,532 |

| | **Three Months Ended June 30, 2018** (in thousands) | | |
|---|---|---|---|
| | Service Contracts | Customer Advances | Total |
| Balance at March 31, 2018 | $ 1,793 | $ 2,060 | $ 3,853 |
| Addition due to business combination | (1) | - | (1) |
| Deferral of revenue | 1,090 | 116 | 1,206 |
| Recognition of deferred revenue | (1,169) | (323) | (1,492) |
| Effect of foreign currency translation | (19) | - | (19) |
| Balance at June 30, 2018 | $ 1,694 | $ 1,853 | $ 3,547 |

| | **Six Months Ended June 30, 2019** (in thousands) | | |
|---|---|---|---|
| | Service Contracts | Customer Advances | Total |
| Balance at December 31, 2018 | $ 1,659 | $ 2,161 | $ 3,820 |
| Deferral of revenue | 1,126 | 251 | 1,377 |
| Recognition of deferred revenue | (1,192) | (473) | (1,665) |
| Effect of foreign currency translation | - | - | - |
| Balance at June 30, 2019 | $ 1,593 | $ 1,939 | $ 3,532 |

| | **Six Months Ended June 30, 2018** (in thousands) | | |
|---|---|---|---|
| | Service Contracts | Customer Advances | Total |
| Balance at December 31, 2017 | $ 505 | $ - | $ 505 |
| Addition due to business combination | 848 | 2,128 | 2,976 |
| Deferral of revenue | 2,283 | 244 | 2,527 |
| Recognition of deferred revenue | (1,927) | (519) | (2,446) |
| Effect of foreign currency translation | (15) | - | (15) |
| Balance at June 30, 2018 | $ 1,694 | $ 1,853 | $ 3,547 |

***Allowance for doubtful accounts***

Activity in the allowance for doubtful accounts was as follows:

| | Six Months Ended June 30, | |
|---|---|---|
| | 2019 | 2018 |
| | (in thousands) | |
| Balance, beginning of period | $ 332 | $ 193 |
| Addition due to business combination | - | 102 |
| Bad debt expense | 368 | 149 |
| Charge-offs and other recoveries | (329) | - |
| Effect of foreign currency translation | (1) | 77 |
| Balance, end of period | $ 370 | $ 521 |

**18. Income Tax**

Income tax benefit from continuing operations was approximately $0.9 million and $0.4 million for the three months ended June 30, 2019 and 2018, respectively. The effective tax rate on continuing operations was 78.2% for the three months ended June 30, 2019 compared with 19.8% for the same period in 2018.

Income tax from continuing operations was a benefit of approximately $0.3 million and an expense of $0.2 million for the six months ended June 30, 2019 and 2018, respectively. The effective tax rate on continuing operations was 10.6% for the six months ended June 30, 2019, compared with (3.3%) for the same period in 2018.

The difference between the Company's effective tax rates in 2019 and 2018 compared to the U.S. statutory tax rate of 21% is primarily due to the mix of year-to-date and forecasted income or losses in the U.S. and foreign tax jurisdictions, the impact of different tax rates in certain foreign jurisdictions, the impact of the inclusion of foreign income in U.S. taxable income under the GILTI (Global Intangible Low-Taxed Income) tax rules, limitations on interest expense deductions and, in 2018, certain non-deductible acquisition costs.

For the three and six months ended June 30, 2019, no income tax expense or benefit was recorded for discontinued operations. For the comparable three-and six-month periods in 2018, income tax benefit recorded for discontinued operations was $10 thousand and $0.9 million.

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

**Forward-Looking Statements**

*This Quarterly Report on Form 10-Q contains statements that are not statements of historical fact and are forward-looking statements within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934 (the Exchange Act). The forward-looking statements are principally, but not exclusively, contained in "Item 2: Management's Discussion and Analysis of Financial Condition and Results of Operations." These statements involve known and unknown risks, uncertainties and other factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. Forward-looking statements include, but are not limited to, statements about management's confidence or expectations, and our plans, objectives, expectations and intentions that are not historical facts. In some cases, you can identify forward-looking statements by terms such as "may," "will," "should," "could," "would," "seek," "expects," "plans," "aim," "anticipates," "believes," "estimates," "projects," "predicts," "intends," "think," "potential," "objectives," "optimistic," "strategy," "goals," "sees," "new," "guidance," "future," "continue," "drive," "growth," "long-term," "projects," "develop," "possible," "emerging," "opportunity," "pursue" and similar expressions intended to identify forward-looking statements. These statements reflect our current views with respect to future events and are based on assumptions and subject to risks and uncertainties. Given these uncertainties, you should not place undue reliance on these forward-looking statements. Factors that may cause our actual results to differ materially from those in the forward-looking statements include reductions in customers' research budgets or government funding; domestic and global economic conditions; economic, political and other risks associated with international revenues and operations; newly enacted U.S. government tax reform; currency exchange rate fluctuations; economic and political conditions generally and those affecting pharmaceutical and biotechnology industries; the seasonal nature of purchasing in Europe; our failure to expand into foreign countries and international markets; our inability to manage our growth; competition from our competitors; failure or inadequacy of the our information technology structure; impact of difficulties implementing our enterprise resource planning systems; information security incidents or cybersecurity breaches; our failure to identify potential acquisition candidates and successfully close such acquisitions with favorable pricing or integrate acquired businesses or technologies; unanticipated costs relating to acquisitions and known and unknown costs arising in connection with our consolidation of business functions and any restructuring initiatives; failure of any banking institution in which we deposit our funds or its failure to provide services; our substantial debt and our ability to meet the financial covenants contained in our credit facility; our failure to raise or generate capital necessary to implement our acquisition and expansion strategy; the failure of Biostage to indemnify us for any liabilities associated with Biostage's business; impact of any impairment of our goodwill or intangible assets; our ability to retain key personnel; failure or inadequacy or our information technology structure; rising commodity and precious metals costs; our ability to protect our intellectual property and operate without infringing on others' intellectual property; exposure to product and other liability claims; global stock market volatility, currency exchange rate fluctuations and regulatory changes caused by the United Kingdom's likely exit from the European Union; plus other factors described under the heading "Item 1A. Risk Factors" in our Annual Report on Form 10-K for the year ended December 31, 2018, or described in our other public filings. Our results may also be affected by factors of which we are not currently aware. We may not update these forward-looking statements, even though our situation may change in the future, unless we have obligations under the federal securities laws to update and disclose material developments related to previously disclosed information.*

**Overview**

Harvard Bioscience, Inc., a Delaware corporation, is a global developer, manufacturer, marketer and provider of a broad range of scientific instruments, systems, software and services used to advance life science for basic research, drug discovery, physiologic monitoring, clinical and environmental testing. Our products and services are sold to thousands of researchers in over 100 countries through our global sales organization, websites, catalogs, and through distributors including Thermo Fisher Scientific Inc., VWR and other specialized distributors. We have sales and manufacturing operations in the United States, the United Kingdom, Germany, Sweden, Spain, France, Canada, Italy and China.

**Recent Business Acquisitions and Dispositions**

In January 2018, we acquired Data Sciences International, Inc. (DSI) for approximately $71.1 million. DSI, a St. Paul, Minnesota-based life science research company, is a recognized leader in physiologic monitoring focused on delivering preclinical products, systems, services and solutions to its customers. Its customers include pharmaceutical and biotechnology companies, as well as contract research organizations, academic labs and government researchers. This acquisition diversifies our customer base into the biopharmaceutical and contract research organization markets and offers revenue and cost synergies. The acquisition also helped to increase our gross profit margins.

In January 2018, we sold substantially all the assets of our wholly-owned subsidiary, Denville Scientific, Inc. (Denville) for approximately $20.0 million, which included a $3.0 million earn-out provision contingent on Denville achieving certain performance metrics with respect to 2018 and 2019 (with potential consideration of $2.0 million based on Denville's performance in 2018, and $1.0 million based on its performance in 2019). During the three months ended June 30, 2019, it was determined that the first potential earn-out consideration amount of $2.0 million for 2018 was not earned, and therefore the maximum the Company may potentially receive of the original $3.0 million earn-out provision is now $1.0 million, which, as described above, is contingent on Denville achieving certain performance metrics.

**Components of Operating Income**

As described above, on January 22, 2018, we sold substantially all the assets of our operating subsidiary, Denville. The sale of Denville represented a strategic shift that had a major effect on our operations and financial results. As such and pursuant to the accounting standards, the operating results of Denville for the three and six months ended June 30, 2018 have been presented in discontinued operations in the consolidated statements of operations. Therefore the amounts and percentages discussed below exclude the revenues and expenses of Denville unless otherwise described.

*Revenues.* We generate revenues by selling apparatus, instruments, devices, systems, software, services, and consumables through distributors, and our direct sales force, websites and catalogs. Our websites and catalogs serve as the primary sales tools for our various product lines. These product lines include both proprietary manufactured products and complementary products from various suppliers. Our reputation as a leading producer in many of our manufactured products creates traffic to our website, enables cross-selling and facilitates the introduction of new products. We have field sales teams in the U.S., Canada, the United Kingdom, Germany, France, Spain and China. In those regions where we do not have a direct sales team, we use distributors. Revenues from direct sales to end users included in continuing operations represented approximately 71% and 58% of our revenues for the three months ended June 30, 2019 and 2018, respectively, and 70% and 56% of our revenues for the six months ended June 30, 2019 and 2018, respectively.

Our products consist of instruments, consumables, and systems that are made up of several individual products. Sales prices of these products range from under $100 to over $100,000, although are mostly priced in the range of $5,000 to $15,000. They are mainly scientific instruments like spectrophotometers and plate readers that analyze light to detect and quantify a wide range of molecular and cellular processes, or apparatus like gel electrophoresis units. Our products and services also include wireless monitors, data acquisition and analysis products and software, and ancillary services including post-contract customer support, training and installation.

We use distributors for both our catalog products and our higher priced products, as well as for sales in locations where we do not have subsidiaries or where we have existing distributors in place from acquired businesses. For the three months ended June 30, 2019 and 2018, approximately 29% and 42% of our total revenues from continuing operations, respectively, were derived from sales to distributors. For the six months ended June 30, 2019 and 2018, approximately 30% and 44% of our total revenues from continuing operations, respectively, were derived from sales to distributors.

Our revenues include complementary products we distribute in order to provide the researcher with a single source for equipment needed to conduct a particular experiment. For the three months ended June 30, 2019 and 2018, approximately 83% and 88% of our revenues from continuing operations, respectively, were derived from products we manufacture and approximately 17% and 12%, respectively, were derived from complementary products we distribute. For the six months ended June 30, 2019 and 2018, approximately 84% and 87% of our revenues from continuing operations, respectively, were derived from products we manufacture and approximately 16% and 13%, respectively, were derived from complementary products we distribute.

For the three months ended June 30, 2019 and 2018, approximately 26% and 31% of our revenues from continuing operations, respectively, were derived from sales made by our non-United States operations. For the six months ended June 30, 2019 and 2018, approximately 28% and 34% of our revenues from continuing operations, respectively, were derived from sales made by our non-United States operations

*Cost of revenues.* Cost of revenues includes material, labor and manufacturing overhead costs, obsolescence charges, packaging costs, warranty costs, shipping costs and royalties. Our cost of revenues may vary over time, including based on the mix of products sold. We sell products that we manufacture and products that we purchase from third parties. The products that we purchase from third parties typically have a higher cost of revenues as a percent of revenues because the profit is effectively shared with the original manufacturer. We anticipate that our manufactured products will continue to have a lower cost of revenues as a percentage of revenues as compared with the cost of non-manufactured products for the foreseeable future. Additionally, our cost of revenues as a percent of revenues will vary based on mix of direct to end user sales and distributor sales, mix by product line and mix by geography.

*Sales and marketing expenses.* Sales and marketing expense consists primarily of salaries and related expenses for personnel in sales, marketing and customer support functions. We also incur costs for travel, trade shows, demonstration equipment, public relations and marketing materials, consisting primarily of the printing and distribution of our catalogs, supplements and the maintenance of our websites. We may from time to time expand our marketing efforts by employing additional technical marketing specialists in an effort to increase sales of selected categories of products. We may also from time to time expand our direct sales organizations in an effort to concentrate on key accounts or promote certain product lines.

*General and administrative expenses.* General and administrative expense consists primarily of salaries and other related costs for personnel in executive, finance, accounting, information technology and human resource functions. Other costs include professional fees for legal and accounting services, information technology infrastructure, facility costs, investor relations, insurance and provision for doubtful accounts.

*Research and development expenses.* Research and development expense consists primarily of salaries and related expenses for personnel and spending to develop and enhance our products. Other research and development expense includes fees for consultants and outside service providers, and material costs for prototype and test units. We expense research and development costs as incurred. Grants received from governmental entities related to research projects are accounted for as a reduction in research and development expense over the period of the project. We believe that investment in product development is a competitive necessity and plan to continue to make these investments in order to realize the potential of new technologies that we develop, license or acquire for existing markets.

*Stock-based compensation expenses.* Stock-based compensation expense related to stock options, restricted stock units, restricted stock units with a market condition and the employee stock purchase plan and was recorded as a component of cost of revenues, sales and marketing expenses, general and administrative expenses, research and development expenses, and income (loss) from discontinued operations.

Stock-based compensation expense for the three months ended June 30, 2019 and 2018 was $0.6 million and $0.7 million, respectively. Stock-based compensation expense for the six months ended June 30, 2019 and 2018 was $1.2 million and $1.7 million, respectively. Included in stock-based compensation for the six months ended June 30, 2018 was $0.2 million related to discontinued operations.

**Selected Results of Operations**

***Three Months Ended June 30, 2019 compared to Three Months Ended June 30, 2018***

| | Three Months Ended June 30, | | Dollar | % |
|---|---|---|---|---|
| | 2019 | 2018 | Change | Change |
| | (dollars in thousands) | | | |
| Revenues | $ 29,584 | $ 31,522 | $ (1,938) | -6.1% |
| Cost of revenues | 13,629 | 16,167 | (2,538) | -15.7% |
| Gross margin percentage | 53.9% | 48.7% | N/A | 10.7% |
| Sales and marketing expenses | 5,770 | 6,309 | (539) | -8.5% |
| General and administrative expenses | 4,809 | 5,258 | (449) | -8.5% |
| Research and development expenses | 2,771 | 2,758 | 13 | 0.5% |
| Amortization of intangible assets | 1,436 | 1,412 | 24 | 1.7% |
| Impairment charges | 941 | - | 941 | 100.0% |
| Other expense, net | 1,360 | 1,485 | (125) | -8.4% |
| Income from discontinued operations | - | 34 | (34) | -100.0% |

Unless otherwise described, the amounts and percentages in the table above and the amounts and percentages discussed below exclude the revenues and expenses of Denville, which is presented in discontinued operations in the Consolidated Statements of Operations and Comprehensive Loss.

***Revenues***

Revenues for the three months ended June 30, 2019 were $29.6 million, a decrease of approximately $1.9 million, or 6.1%, compared to revenues of $31.5 million for the three months ended June 30, 2018.

The decrease in revenue for the three months ended June 30, 2019 was primarily due to lower sales volume in Europe as well as lower volume with contract resource organizations due to customer consolidation. These reductions were partially offset by strong sales from a new product released by DSI. The impact of currency translation negatively impacted revenues in the period by approximately $0.5 million.

| Reconciliation of Changes In Revenues For the Three Months Ended June 30, 2019 Compared to the Same Period of the Prior Year | |
|---|---|
| Organic revenue change, excluding foreign exchange effect | -4.4% |
| Foreign exchange effect | -1.7% |
| Total revenue change, as reported (GAAP) | -6.1% |

Each reporting period, we face currency exposure that arises from translating the results of our worldwide operations to the United States dollar at exchange rates that fluctuate from the beginning of such period. We evaluate our results of operations on both a reported and a foreign currency-neutral basis, which excludes the impact of fluctuations in foreign currency exchange rates. We believe that disclosing the non-GAAP financial information included above, which is used by our management to internally evaluate our operating results, provides investors with an enhanced understanding of the underlying operations of the business, as it highlights the revenue performance of the business excluding the impact of fluctuating foreign currencies, which is outside of management's control. The non-GAAP financial information provided in the table above should be considered in addition to, not as a substitute for, the financial information provided and presented in accordance with accounting principles generally accepted in the United States, or GAAP and may be different than other companies' non-GAAP financial information.

***Cost of revenues***

Cost of revenues were $13.6 million for the three months ended June 30, 2019, a decrease of $2.5 million, or 15.7%, compared with $16.2 million for the three months ended June 30, 2018. The decrease in cost of revenues was primarily due to a $2.2 million charge recognized in cost of revenues related to a purchase accounting inventory fair value step up in connection with the DSI acquisition included in the three months ended June 30, 2018. Gross profit margin as a percentage of revenues increased to 53.9% for the three months ended June 30, 2019 compared with 48.7% for the three months ended June 30, 2018. The increase in gross profit margin was primarily attributable to the effect of the aforementioned $2.2 million charge related to a purchase accounting inventory fair value step up included in the three months ended June 30, 2018. Excluding the impact of this charge, gross profit margin declined primarily due to reduced fixed cost absorption associated with lower revenue as well as product mix.

***Sales and marketing expenses***

Sales and marketing expenses decreased $0.5 million or 8.5% to $5.8 million for the three months ended June 30, 2019 compared to $6.3 million during the same period in 2018. The decrease in these expenses was primarily due to decreases in employee-related expenses and variable sales costs as compared to the three months ended June 30, 2018.

***General and administrative expenses***

General and administrative expenses were $4.8 million for the three months ended June 30, 2019, a decrease of $0.4 million, or 8.5%, compared with $5.3 million for the three months ended June 30, 2018. The decrease was primarily due to lower employee-related costs and bad debt expenses in the three months ended June 30, 2019 as compared to the same period in the prior year.

***Research and development expenses***

Research and development expenses were $2.8 million for the three months ended June 30, 2019, and did not change materially as compared to the prior period.

***Amortization of intangible assets***

Amortization of intangible asset expenses was $1.4 million for the three months ended June 30, 2019 and 2018, respectively, remaining substantially unchanged in the two periods.

***Impairment charges***

During the three months ended June 30, 2019, we recognized an impairment charge of $0.9 million related to certain in-process research and development intangible assets as a result of our on-going evaluation of our capitalized research and development activities. There was no similar impairment charge recognized in the same period in the prior year.

***Other expense, net***

Other expense, net, was $1.4 million and $1.5 million for the three months ended June 30, 2019 and 2018, respectively. Other expense, net, consisted primarily of interest expense which decreased slightly in the three months ended June 30, 2019 as compared to the same period in the prior year primarily due to lower outstanding debt balances.

***Income taxes***

Income tax benefit from continuing operations was approximately $0.9 million and $0.4 million for the three months ended June 30, 2019 and 2018, respectively. The effective income tax rate was 78.2% and 19.8% for the three months ended June 30, 2019 and 2018, respectively.

The difference between our effective tax rates in 2019 and 2018 compared to the U.S. statutory tax rate of 21% is primarily due to the mix of year-to-date and forecasted income or losses in the U.S. and foreign tax jurisdictions, the impact of different tax rates in certain foreign jurisdictions, the impact of the inclusion of foreign income in U.S. taxable income under the GILTI (Global Intangible Low-Taxed Income) tax rules, limitations on interest expense deductions and, in 2018, certain non-deductible acquisition costs.

***Income from discontinued operations***

On January 22, 2018, we sold substantially all the assets of Denville, for approximately $20.0 million, which included a $3.0 million earn-out provision (the Denville Transaction). Denville generated net income of $24 thousand for the three months ended June 30, 2018, which is presented in discontinued operations in the Consolidated Statements of Operations and Comprehensive Loss.

**Selected Results of Operations**

***Six Months Ended June 30, 2019 compared to Six Months Ended June 30, 2018***

| | Six Months Ended June 30, | | | |
|---|---|---|---|---|
| | **2019** | **2018** | **Dollar Change** | **% Change** |
| | (dollars in thousands) | | | |
| Revenues | $ 57,786 | $ 58,281 | $ (495) | -0.8% |
| Cost of revenues | 25,677 | 29,657 | (3,980) | -13.4% |
| Gross margin percentage | 55.6% | 49.1% | N/A | 13.1% |
| Sales and marketing expenses | 12,076 | 11,955 | 121 | 1.0% |
| General and administrative expenses | 10,612 | 10,642 | (30) | -0.3% |
| Research and development expenses | 5,506 | 5,160 | 346 | 6.7% |
| Amortization of intangible assets | 2,866 | 2,515 | 351 | 14.0% |
| Impairment charges | 941 | - | 941 | 100.0% |
| Other expense, net | 3,034 | 5,464 | (2,430) | -44.5% |
| Income from discontinued operations | - | 1,820 | (1,820) | -100.0% |

Unless otherwise described, the amounts and percentages in the table above and those amounts and percentages discussed below exclude the revenues and expenses of Denville, which is presented in discontinued operations in the Consolidated Statements of Operations and Comprehensive Loss.

***Revenues***

Revenues for the six months ended June 30, 2019 were $57.8 million, a decrease of approximately $0.5 million, or 0.8%, compared to revenues of $58.3 million for the six months ended June 30, 2018.

The decrease in revenue for the six months ended June 30, 2019 is due to lower sales volume in Europe as well as lower volume with contract resource organizations due to customer consolidation. These reductions were partially offset by strong sales from a new product released by DSI. Offsetting the overall decrease, revenues for the six months ended June 30, 2019 included six months of revenues from DSI as compared to five months of revenues from DSI included in the six months ended June 30, 2018. The impact of currency translation negatively impacted revenues in the six months ended June 30, 2019 by approximately $1.3 million.

**Reconciliation of Changes In Revenues**
**For the Six Months Ended June 30, 2019 Compared to the Same Period of the Prior Year**

| | |
|---|---|
| Organic revenue change, excluding foreign exchange effect | -4.4% |
| DSI change | 5.8% |
| Foreign exchange effect | -2.2% |
| Total revenue change, as reported (GAAP) | -0.8% |

Each reporting period, we face currency exposure that arises from translating the results of our worldwide operations to the United States dollar at exchange rates that fluctuate from the beginning of such period. We evaluate our results of operations on both a reported and a foreign currency-neutral basis, which excludes the impact of fluctuations in foreign currency exchange rates. We believe that disclosing the non-GAAP financial information included above, which is used by our management to internally evaluate our operating results, provides investors with an enhanced understanding of the underlying operations of the business, as it highlights the revenue performance of the business excluding the impact of fluctuating foreign currencies, which is outside of management's control. The non-GAAP financial information provided in the table above should be considered in addition to, not as a substitute for, the financial information provided and presented in accordance with accounting principles generally accepted in the United States, or GAAP.

***Cost of revenues***

Cost of revenues decreased $4.0 million, or 13.4%, to $25.7 million for the six months ended June 30, 2019 compared with $29.7 million for the six months ended June 30, 2018. Gross profit margin as a percentage of revenues increased to 55.6% for the six months ended June 30, 2019 compared with 49.1% for the six months ended June 30, 2018. Of the $4.0 million increase in gross profit margin, approximately $3.7 million was attributable to the effect of a charge recognized in cost of revenues during the six-months period ended June 30, 2018 related to a purchase accounting inventory fair value step up amortization. This inventory fair value step up was fully recognized into cost of revenues over one inventory turn, or approximately six months.

***Sales and marketing expenses***

Sales and marketing expenses increased $0.1 million or 1.0% to $12.1 million for the six months ended June 30, 2019 compared to $12.0 million during the same period in 2018. Sales and marketing expenses for the six months ended June 30, 2019 included six months of costs from DSI as compared to five months of costs from DSI in the six months ended June 30, 2018. The increase in costs in the six months ended June 30, 2019 were partially offset by decreases in employee-related expenses, variable sales costs and lower stock-based compensation as compared to the prior period.

***General and administrative expenses***

General and administrative expenses were $10.6 million for each of the six months period ended June 30, 2019 and 2018. Costs for the six months ended June 30, 2019 included six months of costs from DSI as compared to five months of costs from DSI in the six months ended June 30, 2018. Other changes in the six months ended June 30, 2019 included decreases in employee-related expenses and stock-based compensation, which were partially offset by an increase in bad debt expenses in the period ended June 30, 2019, as compared to the six months ended June 30, 2018.

***Research and development expenses***

Research and development expenses were $5.5 million for the six months ended June 30, 2019, an increase of $0.3 million, or 6.7%, compared with $5.2 million for the six months ended June 30, 2018. The increase was primarily due to the impact of the acquisition of DSI, as the six months ended June 2019 included six months of research and development expenses from DSI as compared to five months of such expenses in the six months ended June 30, 2018.

***Amortization of intangible assets***

Amortization of intangible asset expenses was $2.9 million and $2.5 million for the six months ended June 30, 2019 and 2018, respectively. The increase of $0.4 million in amortization of intangible assets expense was primarily due to the impact of the DSI acquisition, as the six months ended June 2019 included six months of research and development expenses from DSI as compared to five months of such expenses in the six months ended June 30, 2018.

***Impairment charges***

During the six months ended June 30, 2019, we recognized an impairment charge of $0.9 million related to certain in-process research and development intangible assets as a result of our on-going evaluation of our capitalized research and development activities. There was no similar impairment charge recognized in the same period in the prior year.

***Other expense, net***

Other expense, net, was $3.0 million and $5.5 million for the three months ended June 30, 2019 and 2018, respectively. The decrease of $2.5 million in other expense, net was primarily due to transaction costs incurred in the six months ended June 30, 2018 of approximately $2.8 million related to the acquisition of DSI and divestiture of Denville. These decreases were partially offset by an increase in interest expense as a result of higher average debt balances during the current period compared to the same period last year.

***Income taxes***

Income tax from continuing operations was a benefit of $0.3 million and an expense of $0.2 million for the six months ended June 30, 2019 and 2018, respectively. The effective income tax rate was 10.6% for the six months ended June 30, 2019, compared with (3.3%) for the same period in 2018.

The difference between our effective rates in 2019 and 2018 compared to the U.S. statutory tax rate of 21% is primarily due to the mix of year-to-date and forecasted income or losses in the U.S. and foreign tax jurisdictions, the impact of different tax rates in certain foreign jurisdictions, the impact of inclusion of foreign income in U.S. taxable income under the GILTI (Global Intangible Low-Taxed Income) tax rules, limitations on interest expense deductions, and in 2018, certain non-deductible acquisition costs.

***Income from discontinued operations***

Discontinued operations resulted in income of $1.8 million for the six months ended June 30, 2018. On January 22, 2018, we sold substantially all the assets of Denville, for approximately $20.0 million, which included a $3.0 million earn-out provision contingent on Denville achieving certain performance metrics with respect to 2018 and 2019 (the Denville Transaction). The results of Denville were presented in discontinued operations for both the three and six months ended June 30, 2018. The income from discontinued operations for the six months ended June 30, 2018 included a gain on sale of Denville of $1.3 million and an income tax benefit of $0.9 million. The income tax benefit was mainly due to the reversal of deferred tax liabilities associated with indefinite lived intangibles following the Denville Transaction.

***Liquidity and Capital Resources***

Historically, we have financed our business through cash provided by operating activities, bank borrowings, and the issuance of common stock. Our liquidity requirements arise primarily from investing activities, including funding of acquisitions, and capital expenditures.

On January 22, 2018, we sold the operations of Denville, and received approximately $15.7 million, net of cash on hand. Simultaneously, we retired the existing debt balances of approximately $11.9 million. On January 31, 2018, we entered into a financing agreement, which comprised of a $64.0 million term loan and up to a $25.0 million line of credit. Finally, on January 31, 2018, we acquired DSI for approximately $67.4 million, net of cash acquired.

As of June 30, 2019, we held cash and cash equivalents from continuing operations of $4.9 million, compared with $8.2 million at December 31, 2018. As of June 30, 2019 and December 31, 2018, we had $54.8 million and $60.8 million of borrowings outstanding under our credit facility, net of deferred financing costs, respectively. Total debt, net of cash and cash equivalents was $49.9 million at June 30, 2019, compared to $52.6 million at December 31, 2018. In addition, we had an underfunded United Kingdom pension liability of approximately $0.9 million at June 30, 2019 and December 31, 2018, respectively.

As of June 30, 2019 and December 31, 2018, cash and cash equivalents held by our foreign subsidiaries was $2.3 million and $3.2 million, respectively. As a result of the 2017 Tax Act, post-2017 dividends from qualifying Controlled Foreign Corporations are no longer taxed in the U.S. However, any dividends to the U.S. must still be assessed for withholding tax liability as well as income state tax liability. As a result of our assertion, we determined the potential state income tax liability related to available cash balances at foreign subsidiaries would be immaterial in both 2019 and 2018.

**Condensed Cash Flow Statements**
**(unaudited)**

| | Six Months Ended June 30, | |
|---|---|---|
| | 2019 | 2018 |
| | (in thousands) | |
| Cash flows from operations: | | |
| Net loss | $ (2,617) | $ (5,528) |
| Other adjustments to operating cash flows | 6,551 | 4,630 |
| Changes in assets and liabilities | (1,267) | 2,623 |
| Net cash provided by operating activities | 2,667 | 1,725 |
| Investing activities: | | |
| Additions to property, plant and equipment | (423) | (634) |
| Acquisition, net of cash acquired | - | (68,008) |
| Disposition, net of cash sold | 1,020 | 15,754 |
| Other investing activities | (9) | (24) |
| Net cash provided by (used in) investing activities | 588 | (52,912) |
| Financing activities: | | |
| Proceeds from issuance of debt | 2,300 | 68,500 |
| Repayments of debt | (8,503) | (17,247) |
| Other financing activities | (334) | (548) |
| Net cash (used in) provided by financing activities | (6,537) | 50,705 |
| Effect of exchange rate changes on cash | 43 | 373 |
| Decrease in cash and cash equivalents | $ (3,239) | $ (109) |

Our operating activities provided cash of $2.7 million and $1.7 million for the six months ended June 30, 2019 and 2018, respectively. The increase in net cash flow from operations was primarily due to the decrease in net loss partially offset by the effect of changes in working capital period over period.

Our investing activities provided cash of $0.6 million and used of $52.9 million for the six months ended June 30, 2019 and 2018, respectively. Investing activities during the six months ended June 30, 2019 primarily consisted of cash used for capital expenditures, and the receipt of $1.0 million in connection with the release to the Company of an escrow amount associated with the Denville Transaction. Investing activities during the six months ended June 30, 2018 primarily consisted of $68.5 million paid for the acquisition of DSI and $15.8 million received from the disposition of Denville. We spent $0.4 million and $0.6 million on capital expenditures during the six months ended June 30, 2019 and 2018, respectively.

Our financing activities have historically consisted of borrowings and repayments under our revolving credit facility and term loans, payments of debt issuance costs and the issuance of common stock. During the six months ended June 30, 2019, financing activities used cash of $6.5 million, compared with $50.7 million of cash provided by financing activities for the six months ended June 30, 2018. During the six months ended June 30, 2019, we borrowed $2.3 million and repaid $8.5 million of debt, including an excess cash flow payment of $4.0 million and a payment of $1.0 million in connection with the release of an escrow amount associated with the Denville Transaction as required by the Financing Agreement, and ended the quarter with $54.8 million of borrowings, net of deferred financing costs of $1.4 million. During the six months ended June 30, 2018 we borrowed $68.5 million, repaid $17.2 million of debt and ended the quarter with $61.4 million of borrowings, net of deferred financing costs of $1.7 million. Net cash paid for tax withholdings from the issuance from common stock, related to the vesting of restricted stock units was $0.3 million for the six months ended June 30, 2019. Net cash proceeds from the issuance of common stock for the six months ended June 30, 2018 was $1.4 million.

***Borrowing Arrangements***

On January 22, 2018, in connection with the closing of the sale of Denville, we terminated the Third Amended and Restated Credit Agreement (the Credit Agreement), dated as of May 1, 2017, among us, Brown Brothers Harriman & Co. and each of the other lenders party thereto, and Bank of America, as administrative agent. All outstanding amounts under the agreement were repaid in full using a portion of the proceeds of the Denville sale. At the time of repayment, there was approximately $11.9 million of borrowings outstanding.

On January 31, 2018, we entered into a financing agreement by and among us and certain of our subsidiaries, as borrowers (collectively, the Borrower), certain of our subsidiaries thereto, as guarantors, various lenders from time to time party thereto (the Lenders), and Cerberus Business Finance, LLC, as collateral agent and administrative agent for the Lenders (the Financing Agreement). On August 16, 2018, we and Cerberus Business Finance, LLC entered into a First Amendment to the Financing Agreement, which such amendment modified certain provisions relating to the borrowing base and reporting, among other things.

The Financing Agreement provides for senior secured credit facilities (the Senior Secured Credit Facilities) comprised of a $64.0 million term loan and up to a $25.0 million revolving line of credit. The proceeds of the term loan and $4.8 million of advances under the revolving line of credit were used to fund a portion of the DSI acquisition, and to pay fees and expenses related thereto and the closing of the Senior Secured Credit Facilities. In addition, the revolving facility is available for use by the Company and its subsidiaries for general corporate and working capital needs, and other purposes to the extent permitted by the Financing Agreement. The Senior Secured Credit Facilities have a maturity of five years.

Commencing on March 31, 2018, the outstanding term loans began to amortize in equal quarterly installments equal to $0.4 million per quarter on such date and during each of the next three quarters thereafter, $0.6 million per quarter during the next four quarters thereafter and $0.8 million per quarter thereafter, with a balloon payment at maturity. Furthermore, within ten days of the delivery of our audited annual financial statements each year, the term loans are permanently reduced pursuant to certain mandatory prepayment events including an annual “excess cash flow sweep” of 50% of the consolidated excess cash flow; provided that, in any fiscal year, any voluntary prepayments of the term loans shall be credited against our “excess cash flow” prepayment obligations on a dollar-for-dollar basis for such fiscal year. During the three months ended March 31, 2019, the Company made an excess cash flow payment of $4.0 million as required by the Financing Agreement. Additionally, during the three months ended June 30, 2019, the Company made a payment, as required by the Financing Agreement, of $1.0 million in connection with the release of an escrow amount associated with the Denville sale.

The obligations of the Borrower under the Senior Secured Credit Facilities are unconditionally guaranteed by our and certain of our existing and subsequently acquired or organized subsidiaries. The Senior Secured Credit Facilities and related guarantees are secured on a first-priority basis (subject to certain liens permitted under the Financing Agreement) by a lien on substantially all the tangible and intangible assets of the Borrower and the subsidiary guarantors, including all of the capital stock held by such obligors (subject to a 65% limitation on pledges of capital stock of foreign subsidiaries), subject to certain exceptions.

Interest on all loans under the Senior Secured Credit Facilities is paid monthly. Borrowings under the Financing Agreement accrue interest at a per annum rate equal to, at the Borrower’s option, a base rate plus 4.75% or a LIBOR rate plus 6.25%. The loans are also subject to a 1.25% interest rate floor for LIBOR loans and a 4.25% interest rate floor for base rate loans.

The Financing Agreement contains customary representations and warranties and affirmative covenants applicable to us and our subsidiaries and also contains certain restrictive covenants, including, among others, limitations on the incurrence of additional debt, liens on property, acquisitions and investments, loans and guarantees, mergers, consolidations, liquidations and dissolutions, asset sales, dividends and other payments in respect of our capital stock, prepayments of certain debt, transactions with affiliates and modifications of organizational documents, material contracts, affiliated practice agreements and certain debt agreements. The Financing Agreement also contains customary events of default.

As of June 30, 2019 and December 31, 2018, we had borrowings net of debt issuance costs of $54.8 million and $60.8 million respectively, outstanding. The carrying value of the debt approximates fair value because the interest rate under the obligation approximates market rates of interest available to us for similar instruments. As of June 30, 2019, we were in compliance with all financial covenants contained in the Financing Agreement, were subject to covenant and working capital borrowing restrictions and had available borrowing capacity under our Financing Agreement of $9.5 million.

As of June 30, 2019, the weighted effective interest rate, net of the impact of our interest rate swap, on our Term Loan was 8.85%.

Our forecast of the period of time through which our financial resources will be adequate to support our operations is a forward-looking statement that involves risks and uncertainties, and actual results could vary as a result of a number of factors. Based on our current operating plans, we expect that our available cash, cash generated from current operations and debt capacity will be sufficient to finance current operations, capital expenditures, and debt principal and interest payments for the next 12 months and beyond.

**Critical Accounting Policies**

The critical accounting policies underlying the accompanying unaudited consolidated financial statements are those set forth in Part II, Item 7 included in our Annual Report on Form 10-K for the fiscal year ended December 31, 2018, which was filed with the SEC on March 18, 2019.

**Impact of Foreign Currencies**

Our international operations in some instances operate in a natural hedge as we sell our products in many countries and a substantial portion of our revenues, costs and expenses are denominated in foreign currencies, especially the British pound, the euro, the Canadian dollar and the Swedish krona.

During the three months ended June 30, 2019, changes in foreign currency exchange rates resulted in an unfavorable translation effect on our consolidated revenues and on our consolidated net loss. Changes in foreign currency exchange rates resulted in an unfavorable effect on revenues of approximately $0.5 million and a favorable effect on expenses of approximately $0.3 million. During the six months ended June 30, 2019, changes in foreign currency exchange rates resulted in an unfavorable translation effect on our consolidated revenues and on our consolidated net loss. Changes in foreign currency exchange rates resulted in an unfavorable effect on revenues of approximately $1.3 million and a favorable effect on expenses of approximately $0.8 million.

The loss associated with the translation of foreign equity into U.S. dollars included as a component of comprehensive loss during the three months ended June 30, 2019, was approximately $(0.2) million, compared to a loss of $(2.9) million for the three months ended June 30, 2018. The loss associated with the translation of foreign equity into U.S. dollars included as a component of comprehensive loss during the six months ended June 30, 2019, was approximately $(0.2) million, compared to a loss of $(1.4) million for the six months ended June 30, 2018.

In addition, currency exchange rate fluctuations included as a component of net loss resulted in approximately $0.1 million and $0.3 million in currency losses during the three months ended June 30, 2019 and 2018, respectively. The currency exchange rate fluctuations included as a component of net loss resulted in approximately $(0.1) million and $(2) thousand in currency losses during the six months ended June 30, 2019 and 2018, respectively.

**Recently Issued Accounting Pronouncements**

For information on recent accounting pronouncements impacting our business, see "Recent Accounting Pronouncements" included under Note 2 to our Condensed Consolidated Financial Statements.

**Item 3.** ***Quantitative and Qualitative Disclosures about Market Risk.***

The majority of our manufacturing and testing of products occurs in our facilities in the United States, Germany, Sweden and Spain. We sell our products globally through distributors, our direct sales force, websites and catalogs. As a result, our financial results are affected by factors such as changes in foreign currency exchange rates and weak economic conditions in foreign markets.

We collect amounts representing a substantial portion of our revenues and pay amounts representing a substantial portion of our operating expenses in foreign currencies. As a result, changes in currency exchange rates from time to time may affect our operating results.

We are exposed to market risk from changes in interest rates primarily through our financing activities. As of June 30, 2019, we had $54.8 million outstanding under our Financing Agreement, net of deferred financing costs. We entered into an interest rate swap contract with PNC bank with a notional amount of $36.0 million and a termination date of January 31, 2023 in order to hedge a portion of the risk of changes in the effective benchmark interest rate (LIBOR) associated with the Financing Agreement. The swap contract converted specific variable-rate debt into fixed-rate debt and fixed the LIBOR rate associated with a portion of the term loan under the Financing Agreement at 2.72%.

As of June 30, 2019, the weighted effective interest rates, net of the impact of our interest rate swaps, on our Term Loan was 8.85%. Assuming no other changes which would affect the margin of the interest rate, the estimated effect of interest rate fluctuations on outstanding borrowings under our Financing Agreement as of June 30, 2019 is quantified and summarized as follows:

| **If compared to the rate as of June 30, 2019** | **Interest expense increase** (in thousands) |
|---|---|
| Interest rates increase by 1% | $ 246 |
| Interest rates increase by 2% | $ 492 |

**Item 4.** ***Controls and Procedures.***

Disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act) are designed to ensure that information required to be disclosed in reports filed or submitted under the Exchange Act is recorded, processed, summarized, and reported within the time periods specified in SEC rules and forms and that such information is accumulated and communicated to management, including the Chief Executive Officer and the Principal Financial Officer, to allow timely decisions regarding required disclosures.

As required by Rules 13a-15(e) and 15d-15(e) under the Exchange Act, our management, under the supervision and with the participation of our Chief Executive Officer and Principal Financial Officer, conducted an evaluation of the effectiveness of the design and operation of our disclosure controls and procedures as of June 30, 2019. Our disclosure controls and procedures are designed to provide reasonable assurance 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 our management necessarily was required to apply its judgment in evaluating and implementing our disclosure controls and procedures. Based upon the evaluation described above, our management concluded that our disclosure controls and procedures for the periods covered by this report were effective, as of the end of the period covered by this Quarterly Report on Form 10-Q, in providing reasonable assurance that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is accumulated and communicated to our management, including our Chief Executive Officer and Principal Financial Officer, to allow timely decisions regarding required disclosures, and is recorded, processed, summarized and reported within the time periods specified in the SEC’s rules and forms.

We reviewed our internal control over financial reporting at June 30, 2019. As a result of the acquisition of Data Sciences International, Inc. (DSI) in January 2018, we continue to integrate certain business processes and systems of DSI. Accordingly, certain changes have been made and will continue to be made to our internal controls over financial reporting until such time as this integration is complete. There were no other changes in our internal controls over financial reporting identified in an evaluation thereof that occurred during the six months ended June 30, 2019 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

## PART II. OTHER INFORMATION

**Item 1A.** ***Risk Factors.***

To our knowledge, and except to the extent additional factual information disclosed in this Quarterly Report on Form 10-Q relates to such risk factors, there has been no material changes in the risk factors described in “Item 1A. Risk Factors” in our Annual Report on Form 10-K for the year ended December 31, 2018, which was filed with the SEC on March 18, 2019.

**Item 6.** **Exhibits**

| Exhibit Index | |
|---|---|
| 31.1 | Certification of Chief Financial Officer of Harvard Bioscience, Inc., pursuant to Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002. |
| 31.2 | Certification of Chief Executive Officer of Harvard Bioscience, Inc., pursuant to Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002. |
| 32.1* | Certification of Chief Financial Officer of Harvard Bioscience, Inc., pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002. |
| 32.2* | Certification of Chief Executive Officer of Harvard Bioscience, Inc., pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002. |
| 101.INS | XBRL Instance Document |
| 101.SCH | XBRL Taxonomy Extension Schema Document |
| 101.CAL | XBRL Taxonomy Extension Calculation Linkbase Document |
| 101.LAB | XBRL Taxonomy Extension Labels Linkbase Document |
| 101.PRE | XBRL Taxonomy Extension Presentation Linkbase Document |
| 101.DEF | XBRL Taxonomy Extension Definition Linkbase Document |

* This certification shall not be deemed “filed” for purposes of Section 18 of the Securities Exchange Act of 1934, or otherwise subject to the liability of that section, nor shall it be deemed to be incorporated by reference into any filing under the Securities Act of 1933 or the Securities Exchange Act of 1934.

**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 undersigned thereunto duly authorized.

Date: August 8, 2019

HARVARD BIOSCIENCE, INC.

By: /S/ JAMES GREEN
**James Green**
**Chief Executive Officer**

By: /S/ MICHAEL A. ROSSI
**Michael A. Rossi**
**Chief Financial Officer**

**EXHIBIT 31.1**

**Certification**

I, Michael A. Rossi, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Harvard Bioscience, 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: August 8, 2019

/s/ MICHAEL A. ROSSI
Michael A. Rossi
Chief Financial Officer

**EXHIBIT 31.2**

**Certification**

I, James Green, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Harvard Bioscience, 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: August 8, 2019

/s/ JAMES GREEN
James Green
Chief Executive Officer

**EXHIBIT 32.1**

**CERTIFICATION OF PERIODIC FINANCIAL REPORT**
**PURSUANT TO 18 U.S.C. SECTION 1350**

The undersigned officer of Harvard Bioscience, Inc. (the Company) hereby certifies to her knowledge that the Company's Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2019 (the Report) to which this certification is being furnished as an exhibit, as filed with the Securities and Exchange Commission on the date hereof, fully complies with the requirements of Section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934, as amended (the Exchange Act), and that the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company. This certification is provided solely pursuant to 18 U.S.C. Section 1350 and Item 601(b)(32) of Regulation S-K (Item 601(b)(32)) promulgated under the Securities Act of 1933, as amended (the Securities Act), and the Exchange Act. In accordance with clause (ii) of Item 601(b)(32), this certification (A) shall not be deemed "filed" for purposes of Section 18 of the Exchange Act, or otherwise subject to the liability of that section, and (B) shall not be deemed to be incorporated by reference into any filing under the Securities Act or the Exchange Act, except to the extent that the Company specifically incorporates it by reference.

Date: August 8, 2019

/s/ MICHAEL A. ROSSI
Name: Michael A. Rossi
Title: Chief Financial Officer

**EXHIBIT 32.2**

**CERTIFICATION OF PERIODIC FINANCIAL REPORT PURSUANT TO 18 U.S.C. SECTION 1350**

The undersigned officer of Harvard Bioscience, Inc. (the Company) hereby certifies to his knowledge that the Company's Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2019 (the Report) to which this certification is being furnished as an exhibit, as filed with the Securities and Exchange Commission on the date hereof, fully complies with the requirements of Section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934, as amended (the Exchange Act), and that the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company. This certification is provided solely pursuant to 18 U.S.C. Section 1350 and Item 601(b)(32) of Regulation S-K (Item 601(b)(32)) promulgated under the Securities Act of 1933, as amended (the Securities Act), and the Exchange Act. In accordance with clause (ii) of Item 601(b)(32), this certification (A) shall not be deemed "filed" for purposes of Section 18 of the Exchange Act, or otherwise subject to the liability of that section, and (B) shall not be deemed to be incorporated by reference into any filing under the Securities Act or the Exchange Act, except to the extent that the Company specifically incorporates it by reference.

Date: August 8, 2019

/s/ JAMES GREEN
Name: James Green
Title: Chief Executive Officer