



Harvard Bioscience, Inc.

**2024 Annual Report
Notice of Annual Meeting
Proxy Statement**

Annual Meeting to be held on June 2, 2025



HARVARD BIOSCIENCE, INC.

**84 October Hill Road
Holliston, Massachusetts 01746**

April 21, 2024

Dear Stockholder:

You are cordially invited to attend the 2025 Annual Meeting of Stockholders of Harvard Bioscience, Inc. (the “Annual Meeting”) to be held on Monday, June 2, 2025 at 11:30 a.m. EDT. The Annual Meeting will be held by virtual meeting only. You will not be able to attend the Annual Meeting in person. To be admitted to the Annual Meeting at www.virtualshareholdermeeting.com/HBIO2025, you must enter the control number found on your proxy card, voting instruction form or notice you previously received. You may vote during the Annual Meeting by following the instructions available on the meeting website during the meeting. At the meeting, we will be voting on the matters described in the accompanying proxy statement.

We are using the Internet as our primary means of furnishing the proxy materials to our stockholders. This process expedites the delivery of proxy materials, ensures materials remain easily accessible to stockholders, and allows stockholders to receive clear instructions for receiving materials and voting.

We are mailing the Notice of Internet Availability of Proxy Materials to stockholders on or about April 22, 2025. The proxy statement and our Annual Report on Form 10-K for the year ended December 31, 2024, are available at www.proxyvote.com.

The Notice of Internet Availability of Proxy Materials contains instructions for our stockholders’ use of this process, including how to access or receive copies of our proxy statement and 2024 Annual Report and how to vote by Internet or mail. To the extent you receive a proxy card, such proxy card will also contain instructions on how to vote, including the option to vote by telephone.

If you are unable to attend the meeting virtually, it is still important that your shares be represented and voted. Therefore, regardless of the number of shares you own, **PLEASE VOTE THROUGH THE INTERNET, BY TELEPHONE OR BY MAIL**. Any stockholder who attends the meeting virtually may vote through the meeting website, even if he or she has already voted through the Internet, by telephone or by mail.

The Board of Directors has fixed the close of business on April 7, 2025 as the record date for determination of stockholders entitled to notice of, and to vote at, the Annual Meeting and any adjournments or postponements thereof.

YOUR VOTE IS IMPORTANT. OUR ANNUAL MEETING WILL BE HELD AS A VIRTUAL MEETING. WHETHER OR NOT YOU PLAN TO ATTEND THE ANNUAL MEETING VIRTUALLY, PLEASE CAST YOUR VOTE ONLINE, BY TELEPHONE OR BY COMPLETING, DATING, SIGNING AND PROMPTLY RETURNING YOUR PROXY CARD OR VOTING INSTRUCTION CARD IN THE POSTAGE-PAID ENVELOPE (WHICH WILL BE PROVIDED TO THOSE STOCKHOLDERS WHO REQUEST TO RECEIVE PAPER COPIES OF THESE MATERIALS BY MAIL) BEFORE THE ANNUAL MEETING SO THAT YOUR SHARES ARE REPRESENTED AT THE ANNUAL MEETING.

Sincerely,

A handwritten signature in dark ink, appearing to read 'J. Green', is written over a light blue horizontal line.

James W. Green
*Chairman of the Board, President and
Chief Executive Officer*

HARVARD BIOSCIENCE, INC.
84 October Hill Road
Holliston, Massachusetts 01746
(508) 893-8999

NOTICE OF ANNUAL MEETING OF STOCKHOLDERS
To Be Held on Monday, June 2, 2025

NOTICE IS HEREBY GIVEN that the 2025 Annual Meeting of Stockholders (the “Annual Meeting”) of Harvard Bioscience, Inc. (the “Company”) will be held on June 2, 2025 at 11:30 a.m. EDT. The Annual Meeting will be held by virtual meeting only. You will not be able to attend the Annual Meeting in person. To be admitted to the Annual Meeting at www.virtualshareholdermeeting.com/HBIO2025, you must enter the control number found on your proxy card, voting instruction form or notice you previously received. You may vote during the Annual Meeting by following the instructions available on the meeting website during the meeting. The Annual Meeting will be held for the following purposes:

1. The election of one Class I Director named in the accompanying proxy statement, nominated by the Board of Directors for a three-year term, such term to continue until the annual meeting of stockholders in 2028 and until such Director’s successor is duly elected and qualified or until his earlier resignation or removal;
2. The ratification of the appointment of Grant Thornton LLP as the Company’s independent registered public accounting firm for the fiscal year ending December 31, 2025;
3. Approval, by a non-binding advisory vote, of the compensation of our named executive officers;
4. Approval of the Harvard Bioscience, Inc. Amended and Restated 2021 Incentive Plan to increase the number of authorized shares of Common Stock available for issuance thereunder; and
5. Such other business as may properly come before the Annual Meeting and any adjournments or postponements thereof.

The Board of Directors has fixed the close of business on April 7, 2025 as the record date for determination of stockholders entitled to notice of, and to vote at, the Annual Meeting and any adjournments or postponements thereof. Only holders of our Common Stock of record at the close of business on that date will be entitled to notice of, and to vote at, the Annual Meeting and any adjournments or postponements thereof. Each of the items of business listed above is more fully described in the proxy statement that accompanies this notice.

The Board of Directors of Harvard Bioscience, Inc. recommends that you vote:

- “FOR” the election of the nominee of the Board of Directors as a Director of the Company;
- “FOR” the proposal to ratify the appointment of Grant Thornton LLP as the Company’s independent registered public accounting firm for the fiscal year ending December 31, 2025
- “FOR” the proposal to approve, by a non-binding advisory vote, of the compensation of our named executive officers; and
- “FOR” the approval of the Amended and Restated 2021 Incentive Plan.

Important Notice Regarding the Availability of Proxy Materials for the Annual Meeting to be Held on June 2, 2025. The proxy statement and the Annual Report on Form 10-K for the year ended December 31, 2024 are available at www.proxyvote.com. The Annual Report, however, is not part of the proxy solicitation material.

By Order of the Board of Directors,

A handwritten signature in black ink, appearing to read 'J. Green', is positioned above the printed name and title.

James W. Green
*Chairman of the Board, President and
Chief Executive Officer*

YOUR VOTE IS IMPORTANT. OUR ANNUAL MEETING WILL BE HELD AS A VIRTUAL MEETING. WHETHER OR NOT YOU PLAN TO ATTEND THE ANNUAL MEETING VIRTUALLY, PLEASE CAST YOUR VOTE ONLINE, BY TELEPHONE OR BY COMPLETING, DATING, SIGNING AND PROMPTLY RETURNING YOUR PROXY CARD OR VOTING INSTRUCTIONS CARD IN THE POSTAGE-PAID ENVELOPE (WHICH WILL BE PROVIDED TO THOSE STOCKHOLDERS WHO REQUEST TO RECEIVE PAPER COPIES OF THESE MATERIALS BY MAIL) BEFORE THE ANNUAL MEETING SO THAT YOUR SHARES ARE REPRESENTED AT THE ANNUAL MEETING.

Harvard Bioscience, Inc.
Proxy Statement

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HARVARD BIOSCIENCE, INC.
84 October Hill Road
Holliston, Massachusetts 01746
(508) 893-8999

PROXY STATEMENT

Annual Meeting of Stockholders to Be Held on Monday, June 2, 2025

This proxy statement is furnished in connection with the solicitation of proxies by the Board of Directors (the “Board”) of Harvard Bioscience, Inc. (the “Company” or “we”) for use at the 2025 Annual Meeting of Stockholders of the Company (the “Annual Meeting”) to be held on June 2, 2025, at 11:30 a.m. EDT, and any adjournments or postponements thereof. The Annual Meeting will be held by virtual meeting only. You will not be able to attend the Annual Meeting in person.

To be admitted to the Annual Meeting at www.virtualshareholdermeeting.com/HBIO2025, you must enter the control number found on your proxy card, voting instruction form or notice you previously received. You may vote during the Annual Meeting by following the instructions available on the meeting website during the meeting.

At the Annual Meeting, the stockholders of the Company will be asked to consider and vote upon:

1. The election of one Class I Director named in this proxy statement, nominated by the Board for a three-year term, such term to continue until the annual meeting of stockholders in 2028 and until such Director’s successor is duly elected and qualified or until his earlier resignation or removal;
2. The ratification of the appointment of Grant Thornton LLP as the Company’s independent registered public accounting firm for the fiscal year ending December 31, 2025;
3. Approval, by a non-binding advisory vote, of the compensation of our named executive officers;
4. Approval of the Harvard Bioscience, Inc. Amended and Restated 2021 Incentive Plan to increase the number of authorized shares of Common Stock available for issuance thereunder; and
5. Such other business as may properly come before the Annual Meeting and any adjournments or postponements thereof.

We are furnishing proxy materials, which include our proxy statement and our Annual Report on Form 10-K for the year ended December 31, 2024 (the “Annual Report”), to our stockholders over the Internet, and providing a Notice of Internet Availability of Proxy Materials (the “Notice”) by mail. We believe that this e-proxy process expedites stockholders’ receipt of proxy materials, including our proxy statement and Annual Report, while lowering the costs and reducing the environmental impact of our annual meeting. The Notice is first being mailed to stockholders of the Company on or about April 22, 2025, in connection with the solicitation of proxies for the Annual Meeting. The Board of Directors has fixed the close of business on April 7, 2025 as the record date for the determination of stockholders entitled to notice of, and to vote at, the Annual Meeting (the “Record Date”). Only holders of Common Stock, par value \$ 0.01 per share, of the Company (the “Common Stock”) of record at the close of business on the Record Date will be entitled to notice of, and to vote at, the Annual Meeting. As of the Record Date, there were 44,213,746 shares of Common Stock outstanding and entitled to vote at the Annual Meeting. Each holder of a share of Common Stock outstanding as of the close of business on the Record Date will be entitled to one vote for each share held of record with respect to each matter properly submitted at the Annual Meeting.

The presence, virtually online or by proxy, of holders of at least a majority of the total number of outstanding shares of Common Stock entitled to vote is necessary to constitute a quorum for the transaction of business at the Annual Meeting. Shares held of record by stockholders or their nominees who do not return a signed and dated proxy, properly deliver proxies via the Internet or telephone, or attend the Annual Meeting virtually will not be considered present or represented at the Annual Meeting and will not be counted in determining the presence of a quorum. Consistent with applicable law, abstentions and broker non-votes will be counted toward the quorum requirement.

A broker “non-vote” refers to shares held by a broker or nominee that does not have the authority, either express or discretionary, to vote on a particular matter. If the beneficial owner does not provide voting instructions, the broker or nominee can still vote the shares with respect to matters that are considered to be “routine,” but not with respect to “non-routine” matters. Proposal No. 2, the ratification of the appointment of Grant Thornton LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2025, is considered “routine” under applicable rules. A broker or other nominee may generally vote on routine matters without voting instructions from beneficial owners, and therefore no broker non-votes are expected to exist in connection with Proposal 2. The remaining proposals are considered “non-routine” under applicable rules. A broker or other nominee cannot vote without instructions on non-routine matters, and therefore there may be broker non-votes on those proposals. Accordingly, if you own shares in street name through a broker, bank or other nominee, please be sure to provide voting instructions to your nominee to ensure that your vote is counted on each of the proposals.

With respect to Proposal No. 1, the election of one Class I Director, such Director is elected by a plurality of the votes cast if a quorum is present. In a plurality election, votes may only be cast in favor of or withheld from each nominee; votes that are withheld will be excluded entirely from the vote and will have no effect. This means that the director nominee receiving the highest number of “FOR” votes will be elected as a Director.

Approval of Proposal No. 2 (the ratification of the appointment of Grant Thornton LLP as the Company’s independent registered public accounting firm for the fiscal year ending December 31, 2025), Proposal No. 3 (approval, by a non-binding, advisory vote, of the compensation of our named executive officers), and Proposal No. 4 (approval of the Harvard Bioscience, Inc. Amended and Restated 2021 Incentive Plan) require the affirmative vote of a majority of the votes cast on such matter.

Any shares not voted (whether by abstention, broker non-vote or otherwise) will have no impact on the voting results of each other matter expected to be voted on at the Annual Meeting.

You will not receive a printed copy of the proxy materials unless you request to receive these materials in hard copy by following the instructions provided in the Notice. Instead, the Notice will instruct you how you may access and review all of the important information contained in the proxy materials. The Notice also instructs you how you may submit your proxy via the Internet or mail. To the extent you receive a proxy card, such proxy card will also contain instructions on how you may also vote by telephone (in addition to voting by Internet or mail). If you received a Notice by mail and would like to receive a printed copy of our proxy materials, you should follow the instructions for requesting such materials included in the Notice.

We encourage you to vote either online, by telephone or by completing, signing, dating and returning a proxy card, or if you hold your shares through a broker or nominee, by completing and returning a voting instruction form. This ensures that your shares will be voted on at the Annual Meeting and reduces the likelihood that we will be forced to incur additional expenses soliciting proxies for the Annual Meeting.

Voting over the Internet, by telephone or mailing a proxy card will not limit your right to vote virtually online or to attend the Annual Meeting virtually. Any record holder as of the Record Date may attend the Annual Meeting virtually and may revoke a previously provided proxy at any time by: (i) submitting a new vote on the Internet or by telephone or submitting a properly completed proxy card with a later date; (ii) sending written notice that you are revoking your proxy to the corporate secretary at Harvard Bioscience, Inc., 84 October Hill Road, Holliston, Massachusetts 01746, with such notice received by May 29, 2025; or (iii) attending the Annual Meeting virtually online and voting through the Annual Meeting website. Attendance at the Annual Meeting will not, by itself, revoke a proxy. If your shares are held by your broker or nominee, you should follow the instructions provided by such broker or nominee to revoke an earlier vote.

Beneficial holders who wish to attend the Annual Meeting virtually and vote through the Annual Meeting website should contact their brokerage firm, bank or other financial institution holding shares of Common Stock on their behalf in order to obtain a “legal proxy”, which will allow them to vote through the Annual Meeting website.

You will be able to participate in the Annual Meeting online and submit your questions during the meeting by visiting www.virtualshareholdermeeting.com/HBIO2025. To be admitted to the Annual Meeting, you must enter the control number found on your proxy card, voting instruction form or notice you received. You also will be able to vote your shares electronically prior to or during the Annual Meeting. If you want to submit a question during the Annual Meeting, log into www.virtualshareholdermeeting.com/HBIO2025, type your question into the “Ask a Question” field, and click “Submit.” Questions pertinent to meeting matters will be read and answered during the meeting, subject to time constraints.

If you encounter any difficulties accessing the virtual meeting during the check-in or meeting time, please call the technical support number that will be posted on the Virtual Shareholder Meeting log in page.

Our Board of Directors recommends a vote “FOR” the nominee of the Board of Directors with respect to Proposal No. 1 and “FOR” on Proposal Nos. 2, 3, and 4. Proxies will be voted as specified. If your proxy is properly submitted, it will be voted in the manner you direct. If you submit a properly executed proxy but do not specify instructions with respect to any particular matter to be acted upon at the meeting, proxies will be voted in favor of the Board of Directors’ recommendations.

We will pay the entire expense of soliciting proxies for the Annual Meeting. In addition to solicitations by mail, certain of our Directors, officers and employees (who will receive no compensation for their services other than their regular compensation) may solicit proxies by telephone, in person, e-mail or other means of electronic communication. Banks, brokerage houses, custodians, nominees and other fiduciaries have been requested to forward proxy materials to the beneficial owners of shares of Common Stock held of record by them as of the Record Date, and such custodians will be reimbursed for their expenses.

Important Notice Regarding the Availability of Proxy Materials for the Annual Meeting to be Held on Monday, June 2, 2025: The proxy statement and Annual Report are available at www.proxyvote.com. The Annual Report, however, is not part of the proxy solicitation material.

PROPOSAL 1 ELECTION OF DIRECTORS

The Board of Directors of the Company currently consists of five members and is divided into three classes of Directors, with two Directors in Class I, two Directors in Class II and one Director in Class III.

Once elected, Directors serve for three-year terms with one class of Directors being elected by our stockholders at each annual meeting to succeed the Directors of the same class whose terms are then expiring. Each nominee elected as a Director will continue in office until his or her successor has been duly elected and qualified or until his or her earlier resignation or removal.

Two Class I Directors have terms expiring at the Annual Meeting. One of our Class I Directors, Mr. Bertrand Loy has informed the Company of his decision not to stand for re-election. At the Annual Meeting, one Class I Director, nominated by the Board of Directors, will stand for election to serve until the 2028 annual meeting of stockholders. At the recommendation of the Nominating and Governance Committee, the Board of Directors has nominated Mr. James W. Green for election as a Class I Director of the Company. Mr. Green has agreed to stand for election and, if elected, to serve as a Director. However, if Mr. Green is unable to serve or will not serve, the proxies will be voted for the election of such other person or persons as the Nominating and Governance Committee and the Board of Directors may recommend.

The Board of Directors has determined to decrease the number of Directors such that, effective as of the Annual Meeting, the Company’s Board of Directors will consist of four members to be divided into three classes of Directors, with one Director in Class I, two Directors in Class II, and one Director in Class III. The Board of Directors intends to assess the size of the Board of Directors following the Annual Meeting.

Vote Required

The affirmative vote of a plurality of the votes cast by holders of shares of Common Stock present or represented by proxy and entitled to vote on the matter at the Annual Meeting is required for the election of the nominee for election as the Class I Director of the Company.

OUR BOARD OF DIRECTORS UNANIMOUSLY RECOMMENDS A VOTE “FOR” THE ELECTION OF THE FOLLOWING NOMINEE OF THE BOARD OF DIRECTORS: JAMES W. GREEN.

INFORMATION REGARDING DIRECTORS

Set forth below is certain information regarding the Directors of the Company, including the one Class I Director who has been nominated for election at the Annual Meeting, based on information furnished to the Company by such Directors. The biographical descriptions below for the Directors include, as of the date hereof, their age, all positions they hold with the Company, their principal occupation and business experience over at least the past five years, and the names of other publicly held companies for which they currently serve as Directors or have served as Directors during at least the past five years. The biographical descriptions below for the Directors also include the specific experience, qualifications, attributes

and skills that led to the conclusion by the Board of Directors that such persons should serve as Directors of the Company. In addition to such specific information, we also believe that all of our Directors have a reputation for integrity, honesty and adherence to high ethical standards. Further, they each have demonstrated business acumen and an ability to exercise sound judgment as well as a commitment of service to the Company and our Board.

Independence

The Board of Directors has determined that each of the Directors listed below, other than our Chief Executive Officer Mr. Green, are “independent” as such term is currently defined by applicable Nasdaq rules.

Directors of Harvard Bioscience, Inc.

Name	Age	Principal Occupation	Director Since
Class I Director—Term expires 2025; Nominated to Serve a Term Expiring 2028			
<i>James W. Green</i>	66	President, Chief Executive Officer and Chairman of the Board of Directors of the Company	2015
Class I Director—Term expires 2025; Not Standing for Re-election			
<i>Bertrand Loy (AC)(NGC)</i>	59	President, CEO and Chairman of the Board of Directors of Entegris, Inc., Lead Independent Director of the Board of the Directors of the Company	2014
Class II Directors—Term expires 2026			
<i>Thomas W. Loewald (CC)(NGC)</i>	62	President and CEO of Cambrex Corporation	2017
<i>Katherine A. Eade (AC)(CC)(NGC)</i>	51	Chief Legal Officer of Kyria Therapeutics, Inc.	2017
Class III Director—Term expires 2027			
<i>Alan Edrick (AC)(CC)</i>	57	Executive Vice President and Chief Financial Officer of OSI Systems, Inc.	2019
(AC) Member of the Audit Committee (CC) Member of the Compensation Committee (NGC) Member of the Nominating and Governance Committee			

Class I Director—Term Expiring in 2025; Nominee for Election to Serve a Term Expiring in 2028

James W. Green has served as a Director of the Company since 2015 and was appointed Chairman in 2017. Mr. Green was appointed President and Chief Executive Officer in 2019. Immediately prior to becoming our President and Chief Executive Officer, Mr. Green served as President of Spacelabs Healthcare, a manufacturer of medical equipment, beginning in 2018. Prior to joining Spacelabs, Mr. Green was General Partner of Grantchester Group, a private equity investment firm with experience in healthcare and technology. Mr. Green also previously served as President, Chief Executive Officer and a director of Analogic Corporation, a leading publicly held advanced medical and security imaging company from 2007 until 2016. From 2005 to 2007, Mr. Green worked as Regional Vice President of Unilab Corp., a California division of Quest Diagnostics Corporation. From 1983 to 2005, Mr. Green worked in various other leadership positions at Koninklijke Philips Electronics NV, St. Jude Medical Inc., Beckman Instruments, McDonnell Douglas Corporation and Northrop Advanced Systems. Mr. Green holds a B.S. from the University of Missouri at Columbia, an M.S. from the University of Southern California and is a graduate of the Stanford University Executive Program. We believe Mr. Green’s qualifications to serve on our Board of Directors include his executive leadership experience and global experience in technology, healthcare and life science industries in a variety of executive positions.

Class I Director—Term Expiring in 2025; Not Standing for Re-election

Bertrand Loy has served as a Director of the Company since 2014 and currently serves as Lead Independent Director and as a member of the Audit and Nominating and Governance Committees. Mr. Loy has been Chief Executive Officer, President and a director of Entegris, Inc. since 2012. He became Chair of the Entegris Board in April 2023. From 2005 until 2012, he served Entegris in senior leadership roles including Executive Vice President and Chief Operating Officer and Executive Vice President in charge of information technology, global supply chain and manufacturing operations. He previously served as Chief Financial Officer of Mykrolis, a company spun out of Millipore Corporation, a life science products company, from 2001 until 2005, when Mykrolis merged with Entegris. Prior to that, Mr. Loy served as the Chief Information Officer of Millipore Corporation during 1999 and 2000, and previously served in various strategic planning, global supply chain and financial roles with Millipore and Sandoz Pharmaceuticals (now Novartis), a pharmaceutical company. Mr. Loy has also served on the board of directors of SEMI, the global industry association representing the electronics manufacturing supply chain, since 2013. Mr. Loy holds an M.B.A. from ESSEC Business School in France. We believe Mr. Loy's qualifications to serve on our Board of Directors include his extensive experience as a Chief Executive Officer, as well as his experience in operational management and his extensive international experience in Europe, Asia-Pacific and the Americas.

Class II Directors—Terms Expiring in 2026

Thomas W. Loewald has served as a Director of the Company since 2017. Mr. Loewald currently serves as Chair of the Compensation Committee and is a member of the Nominating and Governance Committee. Since September 2020, Mr. Loewald has served as President and Chief Executive Officer of Cambrex Corporation, a leading private equity-owned contract development & manufacturing organization. Previously, Mr. Loewald served as President of the Flexible Packaging Division of ProAmpac, a private equity-owned flexible packaging company from 2017 to 2020. Prior to that, he served as Senior Vice President and Chief Commercial Officer of Thermo Fisher Scientific, a multinational biotechnology product development company. He previously worked in various roles at Thermo Fisher Scientific from 2002 to 2016. Prior to Thermo Fisher, Mr. Loewald led sales, marketing, and customer service for the adhesives division of Tyco International from 1998 to 2002. Prior to Tyco, Mr. Loewald held a series of roles with General Electric's Plastics and Materials businesses. Mr. Loewald holds a B.A. in economics from Middlebury College and a Master of Business Administration from The Amos Tuck School at Dartmouth College. We believe Mr. Loewald's qualifications to serve on our Board of Directors include his broad global business experience in a wide range of industries from commodity to high growth, his strong strategic management and leadership skills, and his extensive record of success in leading business growth and excellence.

Katherine A. Eade has served as a Director of the Company since 2017. Ms. Eade serves as Chair of the Nominating and Governance Committee and as a member of the Audit and Compensation Committees. Ms. Eade has more than 20 years of experience advising public companies on mergers and acquisitions and other significant corporate transactions, corporate governance and capital markets. Ms. Eade has served as the Chief Legal Officer of Kyria Therapeutics, Inc. since June 2024 and is the general partner of Long Valley Partners and an advisor to Instil Bio, Inc. She served as Interim General Counsel and advisor to Standard Biotech Inc. and as a member of the Board of Directors and Audit Committee of Vaxxinity, Inc. in 2023, and was General Counsel of Checkmate Pharmaceuticals, Inc. and President of Checkmate Pharmaceuticals Security Corporation from 2020 through their acquisition by Regeneron Pharmaceuticals in 2022. Previously, she served as Vice President, Strategic Commercial Affairs at Align Technology, Deputy General Counsel of La-Z-Boy Incorporated, Director, M&A Law and Transactions for Corning Incorporated and Division Counsel for Corning's Life Sciences and Pharmaceutical Technologies divisions. Earlier in her career, Ms. Eade was a corporate attorney at Cleary Gottlieb Steen & Hamilton LLP, a leading international law firm, for over seven years and served as a law clerk for Judge Morton I. Greenberg of the U.S. Court of Appeals for the Third Circuit. Ms. Eade earned a J.D., cum laude, from Harvard Law School and a B.A. in Government, summa cum laude, from Cornell University. We believe Ms. Eade's qualifications to serve on our Board of Directors include her significant experience in mergers and acquisitions, including in the life sciences industry, and her extensive experience in capital markets and corporate governance.

Class III Director—Term Expiring in 2027

Alan Edrick has served as a Director of the Company since 2019. Mr. Edrick currently serves as Chair of the Audit Committee and as a member of the Compensation Committee. Mr. Edrick has over 30 years of financial management and public accounting experience, including mergers and acquisitions, capital markets, financial planning and analysis, and regulatory compliance. Mr. Edrick has been the Executive Vice President and Chief Financial Officer of OSI Systems, Inc., a publicly traded multinational company with leading market positions in homeland security, patient monitoring and optoelectronics, since 2006. Between 2004 and 2006, Mr. Edrick served as Executive Vice President and Chief Financial Officer of BioSource International, Inc. until its sale to Invitrogen Corporation. Between 1998 and 2004, Mr. Edrick served as Senior Vice President and Chief Financial Officer of North American Scientific, Inc., a medical device and specialty

pharmaceutical company. Between 1989 and 1998, Mr. Edrick was employed by Price Waterhouse LLP in various positions including Senior Manager, Capital Markets. Mr. Edrick earned a Bachelor of Arts in economics/business from the University of California, Los Angeles (UCLA) and a Master of Business Administration from UCLA's Anderson School of Management. We believe Mr. Edrick's qualifications to serve on our Board of Directors include his executive leadership experience as a Chief Financial Officer, as well as his significant operating, accounting and financial management expertise, including in the life sciences industry.

INFORMATION REGARDING THE BOARD OF DIRECTORS AND ITS COMMITTEES

During the year ended December 31, 2024, our Board of Directors met or acted by written consent fourteen times. Each of the Directors attended at least 75% of the total number of meetings of the Board of Directors held while he or she was a Director and of the committees of which he or she was a member. The Board of Directors encourages Directors to attend the Annual Meeting of Stockholders of the Company. All five Directors in office at the time attended the 2024 Annual Meeting of Stockholders held on May 14, 2024. The non-employee Directors meet regularly in executive sessions outside the presence of management.

Board Leadership Structure

Our Board of Directors does not have a fixed policy as to whether the roles of Board Chair and Chief Executive Officer should be separated or combined. The Board believes that it is in the best interests of our Company to make this determination periodically based on the then-current circumstances, including the then-current strategic and operating environment and the composition of our Board of Directors and our management team. If the Board Chair is not an independent director, a Lead Independent Director is appointed by the Board.

The Lead Independent Director coordinates the activities of the other independent directors and performs such other duties and responsibilities as the Board of Directors may determine. The duties of the Lead Independent Director include:

- presiding at all meetings of the Board at which the Chairman is not present, including executive sessions of the independent Directors;
- calling meetings of independent Directors;
- serving as the principal liaison between the Chairman and the independent Directors;
- approving meeting agendas for the Board;
- approving the frequency of Board meetings and meeting schedules;
- assuring there is sufficient time for discussion of all agenda items;
- previewing information provided to the Board of Directors, as appropriate;
- being available, when appropriate, for consultation and direct communication with stockholders;
- retaining outside advisors and consultants who report directly to the Board on Board-wide issues;
- leading, together with the Chair of the Nominating and Governance Committee, the Board of Director's annual self-assessment; and
- leading, together with the Chair of the Compensation Committee, the Board of Directors' evaluation of the CEO.

Our Board of Directors believes that it is currently in the best interest of our Company to combine the roles of Board Chair and Chief Executive Officer under the leadership of Mr. Green. Mr. Loy currently serves as our Lead Independent Director. The Board believes that this structure allows us to capitalize on Mr. Green's knowledge and experience to more effectively carry out our operating activities, execute our strategic plans, and foster effective communications between the Board of Directors, our management team, and our external stakeholders. The effectiveness of this structure is further enhanced by Mr. Loy's extensive executive and board experience, which provides a valuable independent perspective to our Board and its leadership. Because Mr. Loy has decided not to stand for re-election, our Board of Directors expects to name a new Lead Independent Director following the Annual Meeting.

Board Committees

The Board of Directors has established an Audit Committee, a Compensation Committee and a Nominating and Governance Committee. The charters of each of our committees are available on the Corporate Governance page in the Investor Relations section of our website at www.harvardbioscience.com. Please note that the information contained on the Company website is not incorporated by reference in, or considered to be a part of, this proxy statement.

Audit Committee

The Audit Committee currently consists of Mr. Edrick, Ms. Eade and Mr. Loy. Mr. Edrick serves as the Chair. The Audit Committee is comprised entirely of independent Directors and operates under a Board-approved charter that sets forth its duties and responsibilities. The Audit Committee met or acted by written consent six times during 2024.

Under its charter, the Audit Committee is responsible for, among other things:

- reviewing our financial statements and related disclosures included in quarterly and annual financial statements, as well as quarterly earnings releases;
- reviewing the adequacy of our system of internal controls;
- appointing, retaining and terminating, and determining compensation of our independent auditors;
- overseeing our independent auditors and the evaluation of the independent auditors' qualifications, performance and independence;
- pre-approving audit and non-audit services to be provided by the independent auditors, which may include the delegation of the pre-approval of non-audit services to one or more members of the committee;
- assessing the independence of the independent auditors, including consideration of the auditors' provision of non-audit services to the Company;
- assuring the regular rotation of audit partners, including any lead and concurring partners, in accordance with applicable laws and regulations; and
- establishing and overseeing procedures for (1) the receipt, retention and treatment of complaints received by the Company regarding accounting, internal controls, or auditing matters and (2) the confidential, anonymous submission by employees of the Company of concerns regarding questionable accounting or auditing matters.

The Board of Directors has determined that Ms. Eade, Mr. Edrick and Mr. Loy are "independent" as such term is currently defined by Nasdaq rules for purposes of service on the Audit Committee. The Board of Directors has also determined that Mr. Edrick qualifies as an "audit committee financial expert" as this term has been defined under the rules of the Securities and Exchange Commission (the "SEC").

Compensation Committee

The Compensation Committee currently consists of Ms. Eade, Mr. Edrick, and Mr. Loewald. Mr. Loewald serves as the Chair. The Compensation Committee is comprised entirely of independent Directors and operates under a Board approved charter that sets forth its duties and responsibilities. The Compensation Committee met or acted by written consent five times in 2024.

Under its charter, the Compensation Committee is responsible for, among other things:

- developing and implementing compensation policies and plans that are appropriate for the Company;
- overseeing the administration of our executive compensation program;

- overseeing the Company's compensation and benefit plans and policies;
- retaining or terminating committee advisors;
- evaluating the independence of compensation advisors;
- reviewing and approving awards under equity-based plans (other than to non-employee directors);
- reviewing and approving the compensation of the Company's executive officers; and
- making recommendations to the Board regarding the compensation of the Company's non-employee directors.

The Board of Directors has determined that Ms. Eade, Mr. Edrick, and Mr. Loewald are "independent" as such term is currently defined by Nasdaq rules for purposes of service on the Compensation Committee.

Nominating and Governance Committee

The current members of the Nominating and Governance Committee are Ms. Eade, Mr. Loewald, and Mr. Loy. Ms. Eade serves as the Chair. The Nominating and Governance Committee is comprised entirely of independent Directors and operates under a Board approved charter that sets forth its duties and responsibilities. The Nominating and Governance Committee met or acted by written consent three times in 2024.

Under its charter, the Nominating and Governance Committee is responsible for, among other things:

- identifying individuals qualified to become Board members, consistent with criteria recommended by the Nominating and Governance Committee and approved by the Board of Directors;
- recommending to the Board of Directors the nominees for election at each annual meeting of stockholders;
- recommending to the Board of Directors the criteria for membership on the Board of Directors and its committees; and
- assisting the Board of Directors with such corporate governance matters as the Board of Directors may request.

In identifying and evaluating nominees for the Board of Directors, the Nominating and Governance Committee may solicit recommendations from any or all of the following sources: non-management Directors, the Chief Executive Officer, other executive officers, third-party search firms or any other source it deems appropriate.

The Nominating and Governance Committee has established procedures for stockholders to recommend Director candidates for consideration. All stockholder recommendations for Director candidates must be submitted in writing to our Chief Financial Officer at 84 October Hill Road, Holliston, Massachusetts 01746, who will forward all recommendations to the Nominating and Governance Committee. All stockholder recommendations for Director candidates must be submitted to the Company not less than 120 calendar days prior to the anniversary of the date on which our proxy statement was released to stockholders in connection with the previous year's annual meeting. All stockholder recommendations for Director candidates must include:

- the name and address of record of the stockholder;
- a representation that the stockholder is a record holder of our securities, or if the stockholder is not a record holder, evidence of ownership in accordance with Rule 14a-8(b)(2) of the Securities Exchange Act of 1934 (the "Exchange Act");
- the name, age, business and residential address, educational background, public company directorships, current principal occupation or employment, and principal occupation or employment for the preceding five full fiscal years of the proposed Director candidate;

- a description of the qualifications and background of the proposed director candidate which addresses the minimum qualifications and other criteria for Board membership approved by the Board of Directors and set forth in the Nominating and Governance Committee Charter;
- a description of all arrangements or understandings between the stockholder and the proposed Director candidate;
- the consent of the proposed Director candidate to be named in the proxy statement, to have all required information regarding such Director candidate included in the proxy statement, and to serve as a Director if elected; and
- any other information regarding the proposed Director candidate that is required to be included in a proxy statement filed pursuant to the rules of the SEC.

The Nominating and Governance Committee will evaluate all such proposed Director candidates, including those recommended by stockholders, in compliance with the procedures established by the Nominating and Governance Committee, in the same manner, with no regard to the source of the initial recommendation of such proposed Director candidate. When considering a potential candidate for membership on the Board of Directors, the Nominating and Governance Committee may consider, in addition to the minimum qualifications and other criteria for Board membership approved by the Board of Directors, all facts and circumstances that the Nominating and Governance Committee deems appropriate or advisable, including, among other things, the skills of the proposed Director candidate, his or her availability, depth and breadth of business experience or other background characteristics, his or her independence and the needs of the Board of Directors. At a minimum, each candidate must have high personal and professional integrity, have demonstrated ability and judgment, and be effective, in conjunction with the other Directors and candidates, in collectively serving the long-term interests of the stockholders. In addition, the Nominating and Governance Committee will recommend that the Board select candidates for nomination to help ensure that a majority of the Board shall be “independent” in accordance with Nasdaq rules and that each of its Audit, Compensation and Nominating and Governance Committees shall be comprised entirely of independent Directors, subject to certain exceptions under the Nasdaq rules to such requirement. Although there is no specific policy regarding the consideration of diversity in identifying Director candidates, the Nominating and Governance Committee may consider whether the candidate, if elected, assists in achieving a mix of Board members that represents a diversity of background and experience. The Nominating and Governance Committee also may consider whether the candidate has direct experience in the biotechnology, pharmaceutical and/or life science research industries or in the markets in which the Company operates.

The Board’s Role in Risk Oversight

Risks to the Company are discussed by the Board of Directors during the year. Management is responsible for the day-to-day management of risks we face, while the Board, as a whole and through its committees, oversees risk management. The Board reviews and discusses with management our policies with respect to risk assessment and risk management, including in relation to legal, compliance and cybersecurity matters. As appropriate, the Board discusses with management, the Audit Committee, and our independent registered public accounting firm financial risks, including with respect to financial reporting and internal controls, and the steps management has taken to address such risks. Our Board also administers its risk oversight function through the required approval by the Board (or a committee of the Board) of significant transactions and other material decisions.

Risk Considerations in our Compensation Programs

The Compensation Committee believes that risks arising from our policies and practices for compensating employees are not reasonably likely to have a material adverse effect on the Company.

Non-Employee Director Stock Ownership Guidelines

Our Board has implemented equity ownership guidelines with respect to our non-employee Directors. The ownership guidelines require each non-employee member of the Board of Directors, within five years from their initial election to the Board, to own shares of our Common Stock having a value of at least three times the value of the non-employee Director annual cash retainer. With respect to satisfying the guidelines, unvested awards of restricted stock units are included in the calculation while stock options are excluded. All of our non-employee Directors were in compliance with these equity ownership guidelines as of December 31, 2024.

CODE OF BUSINESS CONDUCT AND ETHICS

The Board of Directors has adopted a Code of Business Conduct and Ethics, which applies to all Directors, officers and employees of the Company and its subsidiaries including the Chief Executive Officer, the Chief Financial Officer, principal accounting officer, controller and any person performing similar functions. The Code of Business Conduct and Ethics is available on the Corporate Governance page in the Investor Relations section of our website at www.harvardbioscience.com. We intend to post any amendments to or waivers from our Code of Business Conduct and Ethics at this location on our website.

ENVIRONMENTAL, SOCIAL, AND GOVERNANCE

At Harvard Bioscience, we are committed to enabling the discovery, safety and regulatory testing, and production of tomorrow's therapeutics. We strive to be a trusted partner to our customers by supplying products and services that enable advances in life science research and drug development across the continuum from fundamental research, therapy discovery, pre-clinical regulatory safety pharmacology and toxicology testing, to bioproduction.

We believe that conducting our business in a socially, environmentally, and ethically responsible manner is important to our long-term success and the well-being of our stakeholders.

Environmental. We strive to minimize our environmental impact, including through more efficient energy and water usage, minimizing waste and emissions, and encouraging recycling. Consistent with these goals, our product development teams strive to minimize the use of hazardous substances in our products and services and address the issue of e-waste through initiatives such as the European Union's directives on the Restriction of Hazardous Substances (RoHS) and the treatment of waste electrical and electronic equipment (WEEE). We also work closely with our suppliers to advance the responsible sourcing of materials such as conflict minerals and compliance with the European Union's Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) regulation to manage the use of chemical substances.

Social. We believe that providing our customers with products and services that enable the development, testing, and production of tomorrow's therapeutics plays a fundamental role in improving the health and well-being of the global community. Consistent with our mission, many of our employees are highly trained scientists and engineers that bring a unique and innovative perspective to our teams. We also participate in equal employment opportunity outreach programs and in the SkillBridge program, which provides valuable opportunities for armed service members to transition to civilian employment. We strive to foster a culture that promotes fairness, respect, opportunity for all as well as the health, safety and well-being of our employees both in and out of the workplace.

Governance. We are focused on sound corporate governance. This includes a commitment to ethics and integrity, foundational values that we believe are key to our continued success. We have established a Code of Business Conduct and Ethics that applies across all levels of our business, including our Board of Directors, senior executives and all employees worldwide. We have also established a confidential ethics hotline that allows employees to report ethical or legal concerns. More information on our governance policies and procedures and our Code of Business Conduct and Ethics is available elsewhere in this proxy statement and the Investor Relations section of our website at www.harvardbioscience.com.

REPORT OF THE AUDIT COMMITTEE

The undersigned members of the Audit Committee of the Board of Directors of the Company submit this report in connection with the committee's review of the financial reports of the Company for the fiscal year ended December 31, 2024 as follows:

1. The Audit Committee has reviewed and discussed with management the audited financial statements of the Company for the fiscal year ended December 31, 2024.
2. The Audit Committee has discussed with representatives of Grant Thornton LLP the matters required to be discussed with them by applicable requirements of the Public Company Accounting Oversight Board and the SEC.
3. The Audit Committee has received the written disclosures and the letter from the independent accountant required by the Public Company Accounting Oversight Board regarding the independent accountant's communications with the Audit Committee concerning independence, and has discussed with the independent accountant the independent accountant's independence.

Based on the review and discussions referred to above, the Audit Committee recommended to the Board of Directors that the audited financial statements be included in the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2024 for filing with the Securities and Exchange Commission.

Submitted by the Audit Committee:

Alan Edrick, Chair
Katherine A. Eade
Bertrand Loy

DIRECTOR COMPENSATION

Our Compensation Committee is responsible for making recommendations to our Board of Directors with respect to Board compensation, and our Board of Directors is responsible for approving such compensation. Our Compensation Committee periodically reviews our Board compensation to evaluate whether it remains competitive such that we are able to recruit and retain qualified Directors. We use a mix of cash and/or stock-based incentive compensation to attract and retain qualified candidates to serve on our Board. In setting Board compensation, the Board of Directors and the Compensation Committee consider the significant amount of time that Directors expend in fulfilling their duties to the Company as well as the skill-level required by the Company of members of the Board.

Directors who are also employees of the Company receive no additional compensation for their service as Director. Non-employee Directors receive the compensation described below.

Compensation of Non-Employee Directors Upon Initial Election to the Board

Each new non-employee Director, upon his or her initial election to the Board, is entitled to receive a restricted stock unit (“RSU”) award having a grant date fair value of \$150,000. Such RSU award will vest annually over three years and be granted on the fifth business day following his or her initial election to the Board.

Annual Compensation of Non-Employee Directors

Annual Board and Committee Retainers

Each non-employee Director is entitled to receive an annual retainer award for service on the Board of Directors. The annual retainer includes an annual RSU retainer and an annual cash retainer.

The annual RSU retainer is granted on the fifth business day following each annual meeting of stockholders and vests in full (i) immediately prior to the Company’s next annual meeting; or (ii) one year from the date of grant, whichever is earlier, subject to the Director’s continued service through the applicable vesting date. The Lead Independent Director receives an additional RSU retainer for service in that role.

Each non-employee Director is entitled to receive cash retainers for Board and committee service. The Chair of each committee also receives a cash retainer in addition to the cash retainer received for service on the applicable committee. Board and committee retainers are paid quarterly in arrears.

The annual RSU and cash retainer amounts for our non-employee directors are shown in the table below:

Role	Form of Retainer	Annual Retainer Value
Non-employee Director.....	RSUs	\$ 150,000
Lead Independent Director.....	RSUs	\$ 35,000
Non-employee Director.....	Cash	\$ 40,000
Audit Committee chair.....	Cash	\$ 20,000
Audit Committee member.....	Cash	\$ 12,500
Compensation Committee chair.....	Cash	\$ 9,000
Compensation Committee member.....	Cash	\$ 9,000
Nominating and Governance Committee chair.....	Cash	\$ 6,500
Nominating and Governance Committee member.....	Cash	\$ 5,000

Expenses

In addition, non-employee Directors are reimbursed for expenses incurred in connection with attendance at Board and committee meetings.

2024 Director Compensation Table

The following table presents the compensation provided to the non-employee Directors who served during the fiscal year ended December 31, 2024.

Name	Fees Earned or Paid in Cash (\$)	Stock Awards (\$) (1) (2)	Option Awards (\$) (3)	Total (\$)
Katherine Eade.....	73,000	150,000	-	223,000
Alan Edrick.....	81,500	150,000	-	231,500
Thomas Loewald	63,000	150,000	-	213,000
Bertrand Loy	57,500	185,000	-	242,500

- (1) Based on the aggregate grant date fair value computed in accordance with the provisions of FASB ASC 718, “Compensation—Stock Compensation.” Assumptions used in the calculation of this amount are included in Note 14 to the Company’s audited financial statements for the fiscal year ended December 31, 2024 included in the Company’s Annual Report on Form 10-K filed with the SEC on March 13, 2025.
- (2) The aggregate number of unvested RSU awards outstanding at December 31, 2024 and held by the non-employee Directors were as follows: 45,872 awards for Ms. Eade; 45,872 awards for Mr. Edrick; 45,872 awards for Mr. Loewald; 56,575 awards for Mr. Loy.
- (3) The aggregate number of stock options outstanding at December 31, 2024 and held by the non-employee Directors were as follows:

Name	Aggregate Number of Stock Options Outstanding
Katherine Eade	87,600
Alan Edrick	101,800
Thomas Loewald	87,600
Bertrand Loy	-

INFORMATION ABOUT OUR EXECUTIVE OFFICERS

Our current executive officers are:

Name	Age	Position
James W. Green.....	66	President, Chief Executive Officer and Chairman of the Board of Directors
Jennifer Cote	53	Chief Financial Officer and Treasurer

Biographical information for Mr. Green is provided above under the heading “Directors of Harvard Bioscience, Inc.”

Jennifer Cote joined the Company as Vice President of Global Finance in May 2022, was named Interim Chief Financial Officer and Treasurer as of January 1, 2023, and became our Chief Financial Officer and Treasurer in June 2023. Prior to joining the Company, Ms. Cote held various financial, strategy, and operating roles of increasing responsibility at Bose Corporation, a leading supplier of speakers, headphones, electronics and other related products for the consumer audio, automotive, health, and professional audio market from 1999 to March 2022. She served as Bose’s Head of Global Business Services – Strategy Enablement and Finance Services from September 2019 to March 2022 and Global Service Owner for Finance Services from December 2016 to September 2019. Ms. Cote’s previous roles at Bose included Head of Finance for Bose’s Headphones Business Unit, Head of Global Business Operations and Head of Finance for its Professional Systems Division. Earlier in her career, Ms. Cote was employed by Arthur Andersen LLP, in various positions including Audit

Manager. A Certified Public Accountant and Chartered Global Management Accountant, Ms. Cote holds a Bachelor of Science in Accountancy from Villanova University.

Ms. Cote has notified the Company of her resignation from the Company effective upon the filing the Company's Quarterly Report on Form 10-Q for the period ended March 31, 2025, which is expected to be filed on or before May 12, 2025. The Board of Directors has appointed Mark Frost as the Company's Interim Chief Financial Officer and Treasurer effective upon Ms. Cote's resignation.

Mr. Frost, age 62, has served as a consultant to the Company since January 2025. From April 2021 to June 2024, Mr. Frost was Chief Financial Officer of Fathom, a digital manufacturing company providing prototype and bridge production capability to accelerate new product development for Fortune 500 companies. From March 2018 until August 2020, Mr. Frost served as Chief Financial Officer for Argon Medical Devices, a medical devices company planning to go public in Hong Kong. Prior to Argon, Mr. Frost was Chief Financial Officer for three public Healthcare companies including Analogic, AngioDynamics and AMRI. Mr. Frost began his career with General Electric, where he held a variety of finance roles over the course of 14 years. Mr. Frost holds a B.A. in International Relations and Economics from Colgate University. He is also a graduate of the INSEAD Global Executive Program and GE Financial Management Program.

COMPENSATION DISCUSSION AND ANALYSIS

This Compensation Discussion and Analysis, which should be read together with the executive compensation tables set forth below, provides information regarding our executive compensation program for our named executive officers. Our named executive officers for 2024 were:

Name	Title
James W. Green.....	President and Chief Executive Officer
Jennifer Cote	Chief Financial Officer and Treasurer

Objectives of Our Executive Compensation Programs

Our compensation programs for our executive officers are designed to achieve the following key objectives:

- attract and retain high performing and experienced executives;
- motivate and reward executives whose knowledge, skills and performance are deemed critical to our success;
- align the interests of our executives and stockholders by motivating executives to increase stockholder value and rewarding executives when stockholder value increases;
- foster a shared commitment among executives by coordinating their goals; and
- motivate our executives to manage our business to meet our short- and long-term objectives, and reward them for meeting these objectives, including growing our revenues, earnings per share, total market capitalization and share price.

Role and Authority of the Compensation Committee

The Compensation Committee oversees our executive compensation programs. In this role, the Compensation Committee reviews and approves the compensation of our executive officers. Additional information about the Compensation Committee, including its composition and responsibilities, can be found under the heading "Compensation Committee" above. The Compensation Committee's practice has been to establish fiscal year base salaries, and to approve bonus programs and long-term incentive awards, on an annual basis. From time to time, the Compensation Committee makes other adjustments to individual compensation arrangements due to promotions, changes of responsibilities or other appropriate circumstances.

Role of Independent Compensation Consultant

The Compensation Committee engages an independent compensation consultant to provide guidance with respect to the development and implementation of our compensation programs. The Compensation Committee utilizes input from its compensation consultant in determining the appropriate compensation, including base salary, bonus and equity grants, with respect to our named executive officers. The Compensation Committee engaged Frederic W. Cook & Co., Inc. (“FW Cook”) as its independent compensation consultant for 2024.

FW Cook provides no services to the Company other than those performed on behalf of the Compensation Committee. The Compensation Committee considers the independence of its compensation consultant on an annual basis.

Role of Management

The Compensation Committee receives input from our Chief Executive Officer and other members of our senior management team with respect to compensation programs for our executives. The Compensation Committee also receives input from our Chief Executive Officer on the performance of our other executives and on compensation decisions for those executives. The Compensation Committee considers, but is not bound by and does not always accept, the recommendations of our Chief Executive Officer or the other members of our management team with respect to compensation matters. While our Chief Executive Officer and other members of our senior management team typically attend Compensation Committee meetings, the Compensation Committee regularly meets in executive session without management present. Our Chief Executive Officer is not present during voting or deliberations on his compensation. The Compensation Committee also makes compensation decisions with respect to our other executives without them present.

Bases for Our Compensation Policies and Decisions

As a general guideline, the Compensation Committee seeks to establish the target compensation of our executive officers at approximately the median of similarly situated executives, assuming that our Company meets the performance targets established for incentive-based programs. An individual executive’s target compensation may be higher or lower than this guideline based on his or her particular background, experience and performance, market factors, internal equity, and our Company’s financial position. These factors are weighed by the Compensation Committee in its judgment, and no one factor takes precedence over the others.

Given a desire that the compensation of our named executive officers remain largely unchanged from 2023, the Compensation Committee considered peer group and third-party survey data obtained in 2023. In establishing Mr. Green’s 2024 compensation, the Committee utilized third party survey data obtained in 2023.

In establishing Ms. Cote’s 2024 compensation, the Committee considered peer group and survey data obtained in connection with Ms. Cote’s appointment as Chief Financial Officer in 2023. To establish the peer group, the Compensation Committee considered companies that are similar to our Company based on criteria such as industry, market capitalization, revenue, and number of employees. In consultation with FW Cook, the Compensation Committee utilized the following peer group:

Champions Oncology, Inc.	Pro-Dex, Inc.
Electromed, Inc.	Standard Biotech, Inc.
Enzo Biochem, Inc.	Suralign Holdings, Inc.
IRIDEX Corporation	Surmodics, Inc.
Le Maitre Vascular, Inc.	T2 Biosystems, Inc.
Meridian Bioscience, Inc.	Transcat, Inc.
OraSure Technologies, Inc.	UFP Technologies, Inc.

Compensation Practices

Our executive compensation practices include the following, each of which the Compensation Committee believes reinforces our executive compensation objectives:

- market comparison of executive compensation against a relevant peer group, as appropriate;

- use of an independent compensation consultant reporting directly to the Compensation Committee and providing no other services to the Company;
- double-trigger vesting for equity awards in the event of a change in control;
- limited perquisites;
- executive stock ownership guidelines;
- clawback provisions, including a Dodd-Frank compliant clawback policy applicable to our executive officers;
- anti-short selling, anti-margin and hedging policies; and
- an annual say-on-pay vote.

Compensation Elements

The elements of our executive compensation program include base salary, annual cash incentive bonuses, long-term equity incentive compensation, employment agreements and broad-based benefits programs. We have not adopted any formal guidelines for allocating total compensation between long-term and short-term compensation, cash compensation and non-cash compensation, or among different forms of non-cash compensation.

Base Salary

We pay our executive officers a base salary, which our Compensation Committee reviews and determines annually. We believe that a competitive base salary is a necessary element of any compensation program that is designed to attract and retain talented and experienced executives. We also believe that attractive base salaries can motivate and reward executives for their overall performance. Our Compensation Committee established the 2024 annualized base salary of each of our named executive officers as follows:

Executive	2024 Base Salary	Increase over 2023
James W. Green.....	\$ 600,000	1.5%
Jennifer Cote	\$ 309,000	3.0%

In view of the Company's financial condition, Mr. Green's base salary was reduced by forty percent (40%) beginning in September 2024 and by an additional forty percent (40%) of his 2024 base salary beginning in November, 2024. Ms. Cote's base salary was reduced by twenty percent (20%) beginning in October 2024. These reductions continued through the end of 2024.

Annual Cash Incentive Bonuses

Our 2024 annual cash incentive bonus plan (the "2024 Annual Cash Incentive Plan"), as approved by the Compensation Committee, was designed to encourage our executives to achieve predetermined corporate financial performance objectives. The 2024 Annual Cash Incentive Plan emphasized pay for performance and was intended to align executive compensation with the achievement of specified operating results.

The metrics and weightings of the 2024 Annual Cash Incentive Plan were as follows:

Metric	Weighting	Rationale for Metric
Adjusted EBITDA (1)	70%	Encourage a focus on profitable growth and cost containment
Total Revenue	20%	Encourage revenue growth
Operating Cash Flow	10%	Encourage a focus on cash flow and enable debt reduction.

- (1) Adjusted EBITDA is a non-GAAP measure that excludes certain expenses and income resulting from items that we do not believe are representative of the underlying operations of our business. Items excluded include stock-based compensation, amortization of intangibles related to acquisitions, other operating expenses, loss on equity securities, income taxes, and the tax impact of reconciling items. The Committee retained discretion to approve adjustments to be included in the calculation of Adjusted EBITDA for the purpose of determining performance under the 2024 Annual Cash Incentive Plan.

The Committee established pre-determined financial goals for each of the metrics described above.

Target awards for our named executive officers under the 2024 Annual Cash Incentive Plan were established by the Compensation Committee as follows:

Executive	2024 Target Award (% of Base Salary)
James Green	100%
Jennifer Cote	50%

Mr. Green's and Ms. Cote's target awards were unchanged from 2023. Under the terms of their awards, Mr. Green and Ms. Cote were each eligible to receive a cash payment between 0% and 150% of their respective target awards based on the Company's performance with respect to the predetermined financial goals.

The Compensation Committee evaluated our 2024 performance against these goals and determined that neither Mr. Green nor Ms. Cote were eligible to receive a payment under the 2024 Annual Cash Incentive Plan.

Long-Term Equity Incentive Compensation

We grant long-term equity incentive awards in the form of time- and performance-based RSUs to executives as part of our total compensation package. These awards generally represent a significant portion of total executive compensation. We use long-term equity incentive awards to align the interests of our executives and our stockholders by providing our executives with strong incentives to increase stockholder value and a significant reward for doing so.

The 2024 long-term equity incentive awards for our named executive officers consisted of the following two elements:

- Time-based RSUs, which serve as a retentive device and provide an interest in the value of the Company's shares, because, even though they vest over time, they provide recipients with a certain equity interest, assuming continued employment. In addition to promoting retention, time-based RSUs further align executives' interests with the interests of shareholders and provide a long-term ownership mentality as well as motivation to succeed in the long term.
- Performance-based RSUs, which provide an additional incentive for executive officers to create shareholder value, as the vesting of these awards is subject to the achievement of pre-defined performance goals. Vesting of performance-based RSUs awarded to our named executive officers in 2024 is based on our Company's three-year organic revenue growth (which excludes the impact of activities such as acquisitions and divestitures), using our reported revenue for the year-ended December 31, 2023 as the baseline. This is a change from performance-based RSUs awarded to named executive officers in 2023, the vesting of which was based on the Company's relative total shareholder return ("TSR") of our Common Stock as compared to companies in the Russell 2000 stock index. The Compensation Committee believes that the use of three-year organic revenue growth provides a more direct incentive to focus on achieving sustainable revenue growth in our underlying businesses as compared to a relative TSR-based measure.

The Compensation Committee's decisions regarding the amount and type of long-term equity incentive compensation and relative weighting of these awards among total executive compensation have also been based on its understanding of market practices of our comparable companies and take into account additional factors such as level of individual responsibility, experience and performance. The vesting of our long-term equity incentive compensation is typically subject to continued employment with our Company, and in some instances, to acceleration in connection with certain termination events and a change-in-control.

For our named executive officers, time-based and performance-based RSUs each comprised 50% of the total 2024 long-term equity award value, based on the grant date fair market value of the award.

The Compensation Committee approved 2024 long-term equity incentive awards for our named executive officers as follows:

Executive	Award Value (\$)	Target Number of Performance-based RSUs	Number of Time-based RSUs
James Green	\$1,800,000	214,797	214,797
Jennifer Cote	\$300,000	35,800	35,800

The time-based RSUs awarded to our named executive officers in 2024 vest in three equal installments on each of March 19, 2025, 2026, and 2027.

The performance-based RSUs awarded to our named executive officers in 2024 will vest based on the three-year compound annual growth rate ("CAGR") of our organic revenue, using our reported revenue for the year ended December 31, 2023 as the baseline, compared to our organic revenue for the year ending December 31, 2026.

In 2022, Mr. Green received an award of performance-based RSUs, the vesting of which was based on the relative total shareholder return ("TSR") of our Common Stock as compared to companies in the Russell 2000 stock index during the period beginning on March 1, 2022 and ending on December 31, 2024 (the "Performance Period"). Based on the Company's relative TSR over the Performance Period, none of the performance-based RSUs awarded to Mr. Green in 2022 vested. Ms. Cote did not receive an award of performance-based RSUs in 2022.

Vesting of both the performance-based RSUs and time-based RSUs is subject to the executive's continued employment with the Company on the applicable vesting date.

Broad-Based Benefits Programs

All full-time employees in the United States, including our named executive officers, may participate in our Employee Stock Purchase Plan and in our health and welfare benefit programs, including medical coverage, dental coverage, disability insurance, life insurance and our 401(k) plan. The 401(k) plan provides for matching contributions equal to 100% of each dollar contributed up to 1% of eligible compensation plus 50% of each additional 1% of eligible compensation up to 6% for a maximum matching contribution of 3.5%. We offer similar plans in certain foreign countries.

Executive Stock Ownership Guidelines

At the recommendation of our Compensation Committee, our Board of Directors has implemented executive stock ownership guidelines with respect to our named executive officers. The ownership guidelines require that, within five years from their initial appointment or designation as named executive officers, our named executive officers own our Common Stock with a market value equal to at least three times their respective annual base salary. With respect to satisfying such guidelines, stock options are excluded in the calculation while shares owned outright or beneficially owned (as defined under Rule 13d-3 of the Exchange Act), restricted shares, including shares granted but not vested, shares issuable upon the settlement of RSUs and shares acquired pursuant to our Employee Stock Purchase Plan are all included. The Compensation Committee monitors compliance with the stock ownership guidelines. Our named executive officers were in compliance with these guidelines as of December 31, 2024.

Clawbacks

The Company adopted a Dodd-Frank Clawback Policy on October 31, 2023 (the “Clawback Policy”) that complies with the SEC rules under the Dodd-Frank Wall Street Reform and Consumer Protection Act and related Nasdaq listing requirements. The Clawback Policy provides that, in the event the Company is required to prepare an accounting restatement due to material noncompliance with any financial reporting requirement under federal securities laws, erroneously awarded incentive-based compensation received by current and former executive officers during the three completed fiscal years immediately preceding the date that the Company is required to prepare such accounting restatement shall be subject to recovery by the Company.

The Company’s right of recovery under the Clawback Policy is in addition to any other remedies or rights of recovery that may be available to the Company under applicable law or pursuant to other Company policies or agreements, including the clawback provision of the Company’s 2021 Incentive Plan, as may be amended from time to time (the “2021 Incentive Plan”). All awards under the 2021 Incentive Plan (including time- and performance-based awards) and any shares issued pursuant to such awards will be subject to recovery or “clawback” by the Company if and to the extent that the vesting of such awards was determined or calculated based on materially inaccurate financial statements or any other material inaccurate performance metric criteria; or if the Company or its subsidiaries terminate a grantee’s service relationship due to the grantee’s gross negligence or willful misconduct, or determine there are grounds for such a termination (whether or not such actions also constitute “cause” under an award agreement), any awards under the 2021 Incentive Plan, whether or not vested, as well as any shares of stock issued pursuant to awards under the 2021 Incentive Plan shall be subject to forfeiture, recovery and “clawback.” The 2021 Incentive Plan also provides that, if a participant has engaged in any detrimental activity (including noncompliance with restrictive covenants), as determined by the Committee, the Committee may, in its sole discretion, provide for cancellation of any or all of such participant’s outstanding awards (including time- and performance-based awards and/or forfeiture by the participant of any gain realized in respect of awards, and repayment of any such gain promptly to the Company.

The 2021 Incentive Plan also provides that, unless otherwise specifically provided in an award agreement, and to the extent permitted by applicable law, if the Company is required to prepare an accounting restatement due to the material noncompliance of the Company with any financial reporting requirement under the securities laws, the Compensation Committee may, without obtaining the approval or consent of the Company’s shareholders or of any participant, require that any participant who personally engaged in one of more acts of fraud or misconduct that have caused or partially caused the need for such restatement or any current or former chief executive officer, chief financial officer, or executive officer, regardless of their conduct, to reimburse the Company in a manner consistent with Section 409A of the Code, if the award constitutes “Non-Qualified Deferred Compensation,” for all or any portion of any awards granted or settled under the 2021 Incentive Plan, or the Compensation Committee may require the termination or rescission of, or the recapture associated with, any award, in excess of the amount the participant would have received under the accounting restatement.

Insider Trading Policy

The Company has adopted an Insider Trading Policy that includes procedures governing the purchase, sale and/or other disposition of our securities by directors, officers and employees that we believe are reasonably designed to promote compliance with insider trading laws, rules and regulations, and applicable Nasdaq listing standards. A copy of the Company’s Insider Trading Policy is filed with the Company’s Annual Report on Form 10-K for the year ended December 31, 2024, filed with the Securities and Exchange Commission on March 14, 2025.

Anti-Short Selling, Anti-Margin and Hedging Policies

The Company’s Insider Trading Policy explicitly prohibits directors, officers, employees, contractors and part-time and temporary workers in possession of material non-public information from (i) buying, selling, or otherwise transacting in Company’s securities, including common stock, options and any other securities that the Company may issue, such as preferred stock, notes, bonds and convertible securities, as well as derivative securities; and (ii) disclosing information to another individual for the purpose of enabling such individual to trade in the Company’s securities on the basis of such information. The Insider Trading Policy also explicitly prohibits directors, officers, employees, contractors and part-time and temporary workers, whether or not in possession of material non-public information, from (i) engaging in transactions designed to hedge or offset economic risks of owning the Company’s securities, including short sales of the Company’s securities and selling security futures related to the Company’s securities; (ii) trading in options or derivatives related to the Company’s securities; and (iii) and purchasing the Company’s securities on margin (i.e. borrowing money to fund the stock purchase) other than the cashless exercises of employee stock options.

Policies and Practices Related to the Timing of Certain Equity Awards

The Company has no formal policy with regard to the timing of equity awards in relation to the disclosure of material nonpublic information and the Board and Compensation Committee make no determinations as to the timing of such awards in relation to the disclosure of material nonpublic information. The Company has not timed the disclosure of material nonpublic information for the purpose of affecting the value of executive compensation.

2024 SUMMARY COMPENSATION TABLE

The table below summarizes the total compensation paid to or earned by (i) James Green, our President and Chief Executive Officer during the years ended December 31, 2024 and 2023 and (ii) Jennifer Cote, our Chief Financial Officer and Treasurer during the year ended December 31, 2024 and 2023. No other persons served as an executive officer of the Company during the year ended December 31, 2024.

Name and Principal Position	Year	Salary (\$)	Bonus (\$)	Stock Awards (\$)(1)	Non-Equity Incentive Plan	All Other	Total (\$)
					(\$)(2)	(\$)	
James W. Green.....	2024	513,431	-	1,800,000	-	23,145(3)	2,336,576
Chairman, President & Chief Executive Officer	2023	585,625	-	1,772,760	-	33,855(3)	2,392,240
Jennifer Cote	2024	293,654	-	300,000	-	8,947	602,601
Chief Financial Officer and Treasurer (4)	2023	285,789	67,500(5)	210,000	-	7,983	571,272

- (1) Amounts represent the aggregate grant date fair value of restricted stock unit awards as computed in accordance with the provisions of FASB ASC 718, "Compensation – Stock Compensation." The amounts shown include time-based RSU awards and performance-based RSU ("PRSU") awards, each of which has a grant date fair value equal to one-half of the amounts shown. The number of shares earned pursuant to the PRSU awards can vary between 0% and 150% of the number of PRSUs awarded, depending on actual performance. The PRSU awards for 2023 comprise market condition awards, the grant date fair value of which remains fixed irrespective of actual performance. The PRSU awards for 2024 comprise performance condition awards. The values shown for the 2024 performance condition awards assume target performance. The grant date fair value of the 2024 PRSU Awards, assuming maximum performance, would be \$1,350,000 for Mr. Green and \$225,000 for Ms. Cote. See Note 14 to the Consolidated Financial Statements included in our Form 10-K for the year ended December 31, 2024 for a discussion of the assumptions used in valuation of stock awards.
- (2) No amounts were earned under the 2023 or 2024 annual cash incentive bonus plans.
- (3) Amounts shown for 2024 include \$12,000 for personal use of a Company leased automobile, \$11,145 in matching contributions made by the Company to Mr. Green's tax-qualified 401(k) Savings Plan account. Amounts shown for 2023 include \$12,000 for personal usage of Company leased automobile, \$11,500 in matching contributions made by the Company to Mr. Green's tax-qualified 401(k) Savings Plan account, and \$10,355 president's club travel.
- (4) Ms. Cote was appointed as our Interim Chief Financial Officer effective January 1, 2023, and was appointed as our Chief Financial Officer effective June 19, 2023.
- (5) Amount represents a \$67,500 cash bonus in connection with Ms. Cote's appointment as our Interim Chief Financial Officer.

Employment Agreements

Chief Executive Officer

We have entered into an employment agreement with Mr. Green, dated July 2, 2019, which provides for a term of two years from his commencement date of July 8, 2019, which term shall automatically be extended for two additional years on each anniversary of the commencement date unless, not less than 90 days prior to each such date, either party shall have given written notice to the other that it does not wish to extend the agreement. In addition, the agreement provides for an annual base salary, which is subject to review annually by our Board of Directors or Compensation Committee. Furthermore, commencing with fiscal year 2020, Mr. Green is eligible to receive cash incentive compensation on an annual basis of up to one hundred fifty percent (150%) of his base salary upon meeting objectives as determined by the Board of Directors or the

Compensation Committee from time to time. Mr. Green is also eligible to participate in other incentive compensation plans as the Board of Directors or Compensation Committee shall provide for the Company's senior executive officers.

Chief Financial Officer

We entered into an employment agreement with Ms. Cote dated June 19, 2023, in connection with her appointment as our Chief Financial Officer. The agreement provides for a one-year term, which term shall automatically be extended for one additional year on each anniversary of the commencement date of the agreement unless, not less than 90 days prior to each such date, either party shall have given written notice to the other that it does not wish to extend the agreement. Beginning with fiscal year 2024, Ms. Cote became eligible to receive annual target cash incentive compensation of fifty percent (50%) of her base salary. Also beginning with fiscal year 2024, Ms. Cote is eligible to receive annual long-term incentive equity awards upon terms and conditions established by the Board of Directors or Compensation Committee. Ms. Cote's existing annual bonus awards for 2023 and existing equity awards remained in effect according to their existing terms and were not affected by the agreement. Ms. Cote is also eligible to participate in other incentive compensation plans as the Board of Directors or Compensation Committee shall provide for the Company's senior executive officers.

OUTSTANDING EQUITY AWARDS AT FISCAL YEAR-END—2024

The following table sets forth information concerning the number and value of exercisable and unexercisable options to purchase Common Stock, and the number of time-based and performance-based RSUs held by the applicable named executive officers ("NEOs") noted below as of December 31, 2024.

	Option Awards				Stock Awards			
	Number of Securities Underlying Unexercised Options (#) Exercisable	Number of Securities Underlying Unexercised Options (#) Unexercisable	Option Exercise Price (\$)	Option Expiration Date	Number of Shares or Units That Have Not Vested (#)	Market Value of Shares or Units That Have Not Vested (\$)(1)	Equity Incentive Plan Awards: Number of Unearned Shares, Units or Other Rights That Have Not Vested (#)	Equity Incentive Plan Awards: Market or Payout Value of Unearned Shares, Units or Other Rights That Have Not Vested (\$)(1)
James W. Green.....	60,000	-	5.27	5/5/2025	117,713(2)	248,374	339,610(4)	716,577
	352,690	-	2.63	6/11/2027	214,797(3)	453,222	214,797(5)	453,222
Jennifer Cote					8,964(2)	18,914	25,862(4)	54,569
					35,800(3)	75,538	35,800(5)	75,538

- (1) Based on a closing stock price of \$2.11 per share on December 31, 2024, the last trading day of 2024.
- (2) These RSUs were granted on March 6, 2023, and, assuming continued employment with the Company, the unvested shares vest on December 29, 2025.
- (3) These RSUs were granted on March 5, 2024, and, assuming continued employment with the Company, the unvested shares vest in equal installments on each of March 19, 2025, March 19, 2026 and March 19, 2027.
- (4) These performance-based RSUs were granted on March 6, 2023, and will vest based on the Company's relative TSR. The RSUs will vest in full on December 31, 2025, and are linked to the achievement of a relative total shareholder return of the Company's Common Stock from March 6, 2023 to the earlier of December 31, 2025 or the date of a change of control (measured relative to the companies in the Russell 2000 Index and based on the 20-day trading average beginning on the first day of the measurement period and ending on the last day of the measurement period). The target number of RSUs that may be earned is shown above; the maximum amount is 150% of the amount shown.

- (5) These performance-based RSUs were granted on March 5, 2024, and will vest based on the three year compound annual growth rate (“CAGR”) of the Company’s organic revenue, using the Company’s reported revenue for the year ended December 31, 2023 as the baseline, compared to the Company’s organic revenue for the year ending December 31, 2026. The RSUs will vest on March 19, 2027, subject to the Compensation Committee’s determination of final performance. The target number of RSUs that may be earned is shown above; the maximum amount is 150% of the amount shown.

Potential Payments upon Termination or Change-in-Control

The employment agreements with Mr. Green and Ms. Cote require the Company to provide certain payments and benefits in the event of a termination of the executive’s employment by us without cause, by the executive for good reason, upon death or disability or in relation to a change-in-control. The events constituting cause, good reason and a change-in-control are specified in the respective agreement. Such benefits include, without limitation, accrued and unpaid base salary to the date of termination, accrued and unused vacation, and if to the extent required by law, any bonuses or other compensation actually earned for periods ended prior to the termination event. These employment agreements also provide change-in-control benefits and have customary best net/modified economic cutback provisions in relation to Section 280G of the Internal Revenue Code. In some instances, the executive’s receipt of such payments and other benefits in connection with such a termination is subject to the executive signing a general release of claims, as provided in the respective employment agreement.

Mr. Green

If Mr. Green’s employment is terminated due to death or disability, all unvested equity awards shall accelerate and fully vest. We will also pay a cash lump sum equal to the value of his COBRA premiums for a period of twelve (12) months following such termination that may be used by the executive or his spouse and dependents, as applicable, to pay for health insurance coverage that is substantially similar to the coverage the executive and his eligible dependents received prior to the termination.

In the case of a termination by Mr. Green for good reason, or by the Company without cause, and subject to the terms of the agreement, (i) we shall pay Mr. Green an amount equal to eighteen (18) months of his base salary rate in equal installments over the period of one year from the date of termination in accordance with our payroll procedures and (ii) any stock options or other stock based grants which would otherwise vest within 12 months of the date of termination shall become fully vested or non-forfeitable. Further, following any such termination, we shall reasonably determine what annual bonus Mr. Green would have received had he remained employed throughout the fiscal year in which the termination occurs, and if any such annual bonus would have been earned, we shall pay Mr. Green a pro rata portion of such determined annual bonus by a lump-sum cash payment. In addition, we shall also pay a cash lump sum equal to the value of COBRA premiums for a period of eighteen (18) months following the termination that may be used by Mr. Green to pay for health insurance coverage that is substantially similar to the coverage the executive and his eligible dependents received prior to the termination.

If Mr. Green’s employment is terminated by the Company without cause, or if Mr. Green terminates his employment for good reason, in connection with a change-in-control, we shall pay Mr. Green a single lump sum in cash equal to twenty-four (24) months of Mr. Green’s base salary, and all stock options and other stock-based awards granted to the executive shall immediately accelerate and become exercisable or non-forfeitable as of the date of the change in control. In addition, following such termination we shall also pay a cash lump sum equal to the value of COBRA premiums for a period of two (2) years for Mr. Green that may be used to pay for health insurance coverage that is substantially similar to the coverage Mr. Green and his eligible dependents received prior to the termination.

Ms. Cote

If Ms. Cote’s employment is terminated due to death or disability, all unvested equity awards shall be treated based on the terms of the underlying stock award agreements and the Company’s 2021 Incentive Plan. We will also pay a cash lump sum equal to the value of her COBRA premiums for a period of twelve (12) months following such termination that may be used by the executive or her spouse and dependents, as applicable, to pay for health insurance coverage that is substantially similar to the coverage the executive and her eligible dependents received prior to the termination.

If Ms. Cote terminates her employment for good reason or if her employment is terminated by the Company without cause, the Company will pay Ms. Cote an amount equal to twelve (12) months of her base salary rate at date of termination, to be paid over a period of one (1) year, a pro-rata portion of her annual bonus for the year of termination to be paid no later than March 15 of the following year, and a cash lump sum equal to the value of her COBRA premiums for a period of one

year following the date of termination. Upon the date of termination, all unvested equity incentive awards shall be treated based on the terms of the underlying stock award agreements and the 2021 Incentive Plan.

If Ms. Cote terminates her employment for good reason or if her employment is terminated by the Company without cause in connection with a change-in-control, the Company will pay Ms. Cote a cash lump sum equal to twelve (12) months of her base salary rate at the first event constituting a change in control and a cash lump sum equal to the value of her COBRA premiums for a period of one year following the date of termination. Upon the date of termination, all unvested equity incentive awards shall be treated based on the terms of the underlying stock award agreements and the 2021 Incentive Plan.

PAY VERSUS PERFORMANCE

As required by Section 953(a) of the Dodd-Frank Wall Street Reform and Consumer Protection Act and Item 402(v) of Regulation S-K, we are providing the following information about the relationship between executive compensation actually paid (as defined by SEC rules) and certain financial performance of the Company. For further information about how we align executive compensation with the Company's performance, please refer to the Compensation Discussion and Analysis, above. The amounts in the table below are calculated in accordance with SEC rules and do not represent amounts actually earned or realized by our named executive officers including with respect to RSUs and PRSUs.

The following table sets forth the compensation for our principal executive officer and the average compensation for certain of our other named executive officers, each as reported in the Summary Compensation Table and with certain adjustments to reflect Compensation Actually Paid ("CAP") as defined under the SEC rules. The table also provides information with respect to cumulative TSR and net loss.

Pay Versus Performance						
(a)	(b)	(c)	(d)	(e)	(f)	(h)
Year	Summary compensation table total for PEO	Compensation actually paid to PEO	Average summary compensation table total for non-PEO named executives	Average compensation actually paid to non-PEO named executive officers	Value of initial fixed \$100 investment based on total shareholder return	Net Loss (in thousands)
2024	\$ 2,336,576	\$ (2,039,133)	\$ 602,601	\$ 186,797	\$ 29.93	\$ (12,405)
2023	\$ 2,392,240	\$ 7,219,371	\$ 571,272	\$ 891,006	\$ 75.89	\$ (3,415)
2022	\$ 2,328,470	\$ (3,704,926)	\$ 495,343	\$ (1,029,883)	\$ 39.29	\$ (9,516)

Pay Versus Performance

- (1) The dollar amounts reported in column (b) are the amounts of total compensation reported for Mr. Green (our Principal Executive Officer) for each corresponding year in the "Total" column of the Summary Compensation Table. Refer to "Executive Compensation – Summary Compensation Table."
- (2) The dollar amounts reported in column (c) represent the amount of "compensation actually paid" to our Principal Executive Officer, as computed in accordance with Item 402(v) of Regulation S-K. The dollar amounts do not reflect the actual amount of compensation earned by or paid to our Principal Executive Officer during the applicable year. In accordance with the requirements of Item 402(v) of Regulation S-K, the following adjustments were made to our Principal Executive Officer's total compensation for each year to determine the compensation actually paid:

PEO Stock Award Adjustments

Year	Amounts reported in “Stock Awards” column in SCT	Awards forfeited during year using prior year-end values	Year-end fair value of awards granted during covered fiscal year that were outstanding and unvested at year-end	Year-over-year change in fair value at year-end of awards granted in prior fiscal years that were outstanding and unvested at year-end	Change as of vesting date (from end of prior fiscal year) in fair value of awards granted in prior fiscal years for which all applicable vesting conditions were satisfied during covered fiscal year
2024	(1,800,000)	(782,064)	906,443	(2,126,986)	(573,102)
2023	(1,772,760)	—	3,470,396	624,933	2,504,562
2022	(1,721,120)	—	727,176	(3,176,423)	(1,863,029)

- (3) The dollar amounts reported in column (d) represent the average of the amounts reported for our named executive officers as a group (excluding our Principal Executive Officer) in the “Total” column of the Summary Compensation Table in each applicable year. The named executive officer included for purposes of calculating the average amounts in each applicable year was, for fiscal year 2022, Mr. Michael Rossi and Mr. Kenneth Olson, and for fiscal years 2023 and 2024, Ms. Cote (the “Other NEOs”).
- (4) The dollar amounts reported in column (e) represent the average amount of “compensation actually paid” to the Other NEOs, as computed in accordance with Item 402(v) of Regulation S-K. The dollar amounts do not reflect the actual average amount of compensation earned by or paid to the Other NEOs (excluding our Principal Executive Officer) during the applicable year. In accordance with the requirements of Item 402(v) of Regulation S-K, the following adjustments were made to average total compensation for the Other NEOs for each year to determine the compensation actually paid, using the same methodology described above in Note 2.

Non-PEO Named Executive Officers Stock Award Adjustments

Year	Amounts reported in “Stock Awards” column in SCT	Awards forfeited during year using prior year-end values	Year-end fair value of awards granted during covered fiscal year that were outstanding and unvested at year-end	Year-over-year change in fair value at year-end of awards granted in prior fiscal years that were outstanding and unvested at year-end	Change as of vesting date (from end of prior fiscal year) in fair value of awards granted in prior fiscal years for which all applicable vesting conditions were satisfied during covered fiscal year
2024	(300,000)	—	151,076	(161,974)	(104,906)
2023	(210,000)	—	424,134	28,821	76,779
2022	(170,000)	(334,572)	71,824	(744,216)	(348,262)

- (5) Total shareholder return in column (f) assumes \$100 was invested in our Common Shares on December 31, 2021.

Analysis of the Information Presented in the Pay Versus Performance Table

As described in more detail under Compensation Discussion and Analysis, above, a significant portion of our Principal Executive Officer’s compensation is linked directly to our Company’s financial and stock price performance. As reflected in columns (c) and (f) of the Pay Versus Performance table, the year-over-year changes in the compensation actually paid to our Principal Executive Officer were driven primarily by the year-over-year changes in our Company’s stock price and the impact of those stock price changes on the value of his unvested and outstanding equity awards. For 2024, the

compensation actually paid to our Principal Executive Officer reflects the substantial year-over-year decrease in the Company's stock price from 2023 to 2024, and for 2023, the compensation actually paid to our Principal Executive Officer reflects the year-over-year stock price increase over the prior year period. These amounts reflect the alignment between the compensation of our Principal Executive Officer with the interests of our shareholders. The compensation actually paid to our Other NEOs follows a similar trend.

SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT

The following table sets forth information regarding the beneficial ownership of our outstanding Common Stock as of March 20, 2025 by: (i) all persons known by us to own beneficially more than 5% of our Common Stock; (ii) each of our Directors and nominees for Director; (iii) each of the named executive officers; and (iv) all of our Directors and executive officers as a group.

The number of shares beneficially owned by each stockholder is determined under rules issued by the SEC and includes voting or investment power with respect to securities. Under these rules, beneficial ownership includes any shares as to which the individual or entity has sole or shared voting power or investment power and includes any shares as to which the individual or entity has the right to acquire beneficial ownership within 60 days after March 20, 2025 through the exercise of any warrant, stock option or other right. The inclusion in this proxy statement of such shares, however, does not constitute an admission that the named stockholder is a direct or indirect beneficial owner of such shares. Common stock subject to options currently exercisable, or exercisable within 60 days after March 20, 2025 are deemed outstanding for the purpose of computing the percentage ownership of the person holding those options but are not deemed outstanding for computing the percentage ownership of any other person.

Unless otherwise indicated below, to our knowledge, all persons named in the table have sole voting and investment power with respect to their shares of Common Stock, except to the extent spouses share authority under community property laws.

<u>Name and Address of Beneficial Owner</u>	<u>Common Stock Beneficially Owned</u>	
	<u>Shares</u>	<u>Percent (2)</u>
<i>Greater than 5% Holders (14)</i>		
Leviticus Partners, L.P. / AHM Equity, LLC..... 32 Old Mill Road Great Neck, NY 11023	3,284,535	7.43%(3)
B. Riley Asset Management, LLC 3811 Turtle Creek Blvd, Suite 2125 Dallas, TX 75219	2,939,278	6.65%(4)
Punch & Associates Investment Management, Inc. 7701 France Ave. So., Suite 300 Edina, MN 55435	2,918,034	6.60%(5)
BlackRock, Inc. 55 Hudson Yards New York, NY 10001	2,913,814	6.59%(6)
Harvey Partners, LLC..... 120 White Plains Road, Suite 430 Tarrytown, NY 10591	2,557,500	5.78%(7)
Weber Capital Management, LLC 580 California Street, Suite 1663 San Francisco, CA 94104	2,516,930	5.69%(8)
<i>Non-Employee Directors (1)</i>		
Bertrand Loy	556,208	1.3%(9)
Thomas Loewald	382,911	*(10)
Katherine Eade	398,726	*(10)
Alan Edrick	375,711	*(11)
<i>Named Executive Officers (1)</i>		
James Green	2,442,460	5.5%(12)
Jennifer Cote	64,526	*
All Directors and Current Executive Officers, as a group (6 persons)	4,220,542	9.5%(13)

* Represents beneficial ownership of less than one percent (1%) of our outstanding Common Stock.

- (1) The address for all non-employee directors and named executive officers is c/o Harvard Bioscience, Inc., 84 October Hill Road, Holliston, Massachusetts 01746.
- (2) Based on 44,213,746 shares outstanding on March 20, 2025, together with the applicable options and restricted stock units for each stockholder.
- (3) This information is based solely upon a Schedule 13G filed by Leviticus Partners, L.P. / AHM Equity, LLC. with the SEC on March 17, 2025, reporting sole voting and dispositive power over 3,284,535 shares.
- (4) This information is based solely upon a Schedule 13G/A filed by B. Riley Asset Management, LLC. with the SEC on February 14, 2024, reporting shared voting and dispositive power over 2,939,278 shares
- (5) This information is based solely upon a Schedule 13G/A filed by Punch & Associates Investment Management, Inc. with the SEC on February 14, 2024, reporting sole voting and dispositive power over 2,918,034 shares.
- (6) This information is based solely upon a Schedule 13G filed by BlackRock, Inc. with the SEC on January 26, 2024, reporting sole voting and dispositive power over 2,913,814 shares.
- (7) This information is based solely upon a Schedule 13G/A filed by Harvey Partners, LLC with the SEC on February 14, 2024, reporting sole voting and dispositive power over 2,557,500 shares.
- (8) This information is based solely upon a Schedule 13G filed by Weber Capital Management, LLC with the SEC on February 10, 2025, reporting sole voting and dispositive power over 2,516,930 shares.
- (9) Includes 56,575 restricted stock units that will fully vest within 60 days after March 20, 2025, and an aggregate of 499,633 shares held through Mr. Loy's revocable trust.
- (10) Includes options to acquire 87,600 shares that are exercisable within 60 days after March 20, 2025, as well as 45,872 restricted stock units that will fully vest within 60 days after March 20, 2025.
- (11) Includes options to acquire 101,800 shares that are exercisable within 60 days after March 20, 2025, as well as 45,872 restricted stock units that will fully vest within 60 days after March 20, 2025.
- (12) Includes options to acquire 412,690 shares that are exercisable within 60 days after March 20, 2025.
- (13) Group includes our non-employee directors, Mr. Green and Ms. Cote. Includes options to acquire 689,690 shares that are exercisable within 60 days after March 20, 2025 as well as 194,191 restricted stock units that will fully vest within 60 days after March 20, 2025.
- (14) This information is based solely on a review of the Schedule 13G reports or related amendments filed with the SEC with respect to holdings of our common stock as of April 1, 2025.

EQUITY COMPENSATION PLAN INFORMATION

The following table sets forth information as of December 31, 2024 concerning the number of shares of Common Stock issuable under our existing equity compensation plans.

Plan Category	Number of Securities to be Issued Upon Exercise of Outstanding Options, Restricted Stock Units, Warrants and Rights	Weighted Average Exercise Price of Outstanding Options, Warrants, And Rights	Number of Securities Remaining Available For Future Issuance Under Equity Compensation Plans (Excluding Securities Reflected In Column (a))
	(a)	(b)	(c)
Equity compensation plans approved by security holders (1)	3,141,306	\$ 3.24	2,478,721(2)
Equity compensation plans not approved by security holders.....	-	\$ 0.00	-
Total	<u>3,141,306</u>		<u>2,478,721</u>

- (1) Consists of the 2021 Incentive Plan and the Harvard Bioscience, Inc. Employee Stock Purchase Plan (as amended, the “ESPP”). Number of securities in column (a) for plans approved by stockholders consists of 827,458 outstanding stock options and 2,313,848 RSUs.
- (2) Represents 2,356,173 shares available for future issuance under the 2021 Incentive Plan and 122,548 shares available for future issuance under the ESPP.

TRANSACTIONS WITH RELATED PERSONS

The Audit Committee charter sets forth the standards, policies and procedures that we follow for the review, approval or ratification of any related person transaction that we are required to report pursuant to Item 404(a) of Regulation S-K promulgated by the SEC. Pursuant to the Audit Committee charter, the Audit Committee reviews these related person transactions on an ongoing basis and the approval of the Audit Committee is required for all such transactions. The Audit Committee relies on management to identify related person transactions and bring them to the attention of the Audit Committee.

Since the fiscal year beginning January 1, 2023, we were not a participant in any related person transactions that required disclosure under this heading.

DELINQUENT SECTION 16(A) REPORTS

Our executive officers, Directors and beneficial owners of more than 10% of our Common Stock are required under Section 16(a) of the Exchange Act to file reports of ownership and changes in ownership with the SEC. Copies of those reports must also be furnished to us.

Based solely on a review of the copies of the reports furnished to us, and written representations from certain reporting persons that no other reports were required, we believe that during the year ended December 31, 2024, the reporting persons complied on a timely basis with all Section 16(a) filing requirements applicable to them.

STOCKHOLDER COMMUNICATIONS WITH THE BOARD OF DIRECTORS

Stockholders and other interested parties wishing to communicate with the Board of Directors may do so by sending a written communication to any Director at the following address: Harvard Bioscience, Inc., 84 October Hill Road, Holliston, Massachusetts 01746. The mailing envelope should contain a notation indicating that the enclosed letter is a “Board Communication.” All such letters should clearly state whether the intended recipients are all members of the Board of Directors or certain specified individual Directors. Our Secretary or his or her designee will make a copy of any such communication so received and promptly forward it to the Director or Directors to whom it is addressed.

INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The following table presents fees for professional services provided by Grant Thornton LLP for the audits of the Company's annual consolidated financial statements for the last two fiscal years, in each of the following categories is as set forth in the table below.

	<u>2024</u>	<u>2023</u>
Audit Fees (1).....	\$ 1,587,708	\$ 1,148,803
Audit Related Fees	-	-
Tax Fees (2).....	5,478	5,968
Other.....	-	-
Total Fees	<u>\$ 1,593,186</u>	<u>\$ 1,154,771</u>

- (1) Audit Fees included fees billed or expected to be billed for professional services associated with the annual audit of our consolidated financial statements and internal controls over financial reporting and the reviews of our quarterly reports on Form 10-Q, and fees related to a registration statement on Form S-3 filed in 2024.
- (2) Tax Fees included domestic and international tax compliance, tax advice and tax planning.

All of the services performed in the year ended December 31, 2024 were pre-approved by the Audit Committee. It is the Audit Committee's policy to pre-approve all audit and permitted non-audit services to be provided to us by the independent registered public accounting firm. The Audit Committee's authority to pre-approve non-audit services may be delegated to one or more members of the Audit Committee, who shall present all decisions to pre-approve an activity to the full Audit Committee at its first meeting following such decision. The Audit Committee has delegated this pre-approval authority for non-audit services to the Audit Committee Chair. In addition, the Audit Committee has considered whether the provision of the non-audit services above is compatible with maintaining the independent registered public accounting firm's independence.

PROPOSAL 2

RATIFICATION OF APPOINTMENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The Audit Committee of the Board of Directors has appointed Grant Thornton LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2025. Grant Thornton LLP has served as our independent registered public accounting firm since 2017. The Audit Committee is responsible for the appointment, retention, termination, compensation and oversight of the work of our independent registered public accounting firm. To execute this responsibility, the Audit Committee annually evaluates the independent auditor's qualifications, performance and independence and whether the independent registered public accounting firm should be rotated, and considers the advisability and potential impact of selecting a different independent registered public accounting firm.

The Board is submitting the appointment of Grant Thornton LLP to our stockholders for ratification because we value the views of our stockholders. In the event that our stockholders fail to ratify the appointment of Grant Thornton LLP, the Audit Committee will reconsider the appointment of Grant Thornton LLP. Even if the appointment is ratified, the ratification is not binding and the Audit Committee may in its discretion select a different independent registered public accounting firm at any time during the year if it determines that such a change would be in the best interests of the Company and our stockholders.

A representative of Grant Thornton LLP is expected to be present virtually at the Annual Meeting. He or she will have an opportunity to make a statement, if he or she desires to do so, and will be available to respond to appropriate questions.

Vote Required

The affirmative vote of a majority of the votes cast by holders of shares of Common Stock present or represented by proxy and entitled to vote on the matter at the Annual Meeting is required for the ratification of the appointment of Grant Thornton LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2025.

OUR BOARD OF DIRECTORS UNANIMOUSLY RECOMMENDS A VOTE "FOR" THE RATIFICATION OF THE APPOINTMENT OF GRANT THORNTON LLP AS OUR INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM FOR THE FISCAL YEAR ENDING DECEMBER 31, 2025.

PROPOSAL 3

ADVISORY VOTE ON THE COMPENSATION OF OUR NAMED EXECUTIVE OFFICERS

Background

We are seeking an advisory vote from our stockholders, as required under Section 951 of the Dodd-Frank Act, to approve our named executive officer compensation, as set forth below. The Compensation Committee and Board of Directors welcome our stockholders' views on this subject, and will carefully consider the outcome of this vote consistent with the best interests of all stockholders. As an advisory vote, however, the outcome is not binding on us or the Compensation Committee or the Board of Directors.

Our executive compensation program is designed to attract and retain high performing and experienced executives; motivate and reward executives whose knowledge, skills and performance are critical to our success; align the interests of our executives and stockholders by motivating executives to increase stockholder value and rewarding executives when stockholder value increases; foster a shared commitment among executives by coordinating their goals; and motivate our executives to manage our business to meet our short and long-term objectives, and reward them for meeting these objectives. Please refer to the "Compensation Discussion and Analysis" section of this proxy statement for additional details about our executive compensation programs, including information about the fiscal year 2024 compensation of our named executive officers. Specifically, we are seeking a vote on the following resolution:

RESOLVED, that the stockholders approve, on a non-binding advisory basis, the compensation of our named executive officers as disclosed in the Company's proxy statement for the 2025 Annual Meeting of Stockholders pursuant to Item 402 of Regulation S-K.

Vote Required

The affirmative vote of a majority of the votes cast by holders of shares of Common Stock present or represented by proxy and entitled to vote on the matter at the Annual Meeting is required for the approval of the resolution to approve the compensation of our named executive officers.

OUR BOARD OF DIRECTORS UNANIMOUSLY RECOMMENDS A VOTE "FOR" THE RESOLUTION TO APPROVE THE COMPENSATION OF OUR NAMED EXECUTIVE OFFICERS.

PROPOSAL 4

APPROVAL OF THE AMENDED AND RESTATED HARVARD BIOSCIENCE, INC. 2021 INCENTIVE PLAN

Equity awards are the principal vehicle by which we provide long-term compensation, align the financial incentives or our directors and employees with our stockholders, and assist in the recruitment, retention, and motivation of key personnel.

An adequate reserve of shares available for issuance under the Company's equity incentive plans is necessary to enable the Company to attract, motivate, and retain key employees, directors, advisors to and consultants of the Company. The Board believes that the number of shares currently available under the Company's 2021 Incentive Plan does not allow for a sufficient number of shares to adequately provide for future awards.

On April 21, 2025, the Board of Directors adopted, subject to stockholder approval, an amendment to and restatement of the 2021 Incentive Plan (the "Amended and Restated 2021 Incentive Plan") that would increase the number of shares of common stock reserved for issuance under the 2021 Incentive Plan by 3,923,000 shares. The 2021 Incentive Plan reserves for issuance 2,200,000 shares, plus the number of shares that were available for grant under the Harvard Bioscience, Inc. Fourth Amended and Restated 2000 Stock Option and Incentive Plan (the "Prior Plan") as of May 18, 2021 (the "Carryover Shares"), subject to certain adjustments as set forth in the Prior Plan. As amended, the Amended and Restated 2021 Incentive Plan reserves for issuance 6,123,000 shares, plus the Carryover Shares, subject to certain adjustments as set forth in the Amended and Restated 2021 Incentive Plan. The Amended and Restated 2021 Incentive Plan will become effective on the date it is approved by the Company's stockholders.

If our stockholders do not approve the Amended and Restated 2021 Incentive Plan, the Compensation Committee will be required to implement other non-equity related compensation programs to attract, retain and compensate executives, non-employee directors and other key employees.

Vote Required

The proposal to approve the Amended and Restated 2021 Incentive Plan will be approved upon the affirmative vote of a majority of the votes properly cast for and against such matter. Abstentions and broker non-votes are not included in the number of votes cast for and against a matter and therefore have no effect on the vote on such matter.

THE BOARD OF DIRECTORS OF THE COMPANY UNANIMOUSLY RECOMMENDS A VOTE “FOR” THE ADOPTION AND APPROVAL OF THE HARVARD BIOSCIENCE, INC. AMENDED AND RESTATED 2021 INCENTIVE PLAN.

Summary of the proposed Amended and Restated 2021 Incentive Plan

The following is a summary of the material terms of the Amended and Restated 2021 Incentive Plan. This summary is not complete and is qualified in its entirety by reference to the full text of the Form of 2021 Incentive Plan attached to this Proxy Statement as Annex A, which assumes that this Proposal 4 is approved.

Purpose

The Amended and Restated 2021 Incentive Plan allows the Company to provide employees, consultants and all members of the Board who are selected to receive awards under the Amended and Restated 2021 Incentive Plan the opportunity to acquire an equity interest in the Company. The Board believes that equity incentives are a significant factor in attracting and motivating eligible persons whose present and potential contributions are important to the Company and aligning their interests with those of our shareholders.

Proposed Share Reserve

Pursuant to the 2021 Incentive Plan, the 2021 Incentive Plan’s share reserve is equal to the sum of 2,200,000 shares plus the Carryover Shares, subject to certain adjustments as set forth in the 2021 Incentive Plan. The Company is asking its stockholders to approve an additional 3,923,000 shares to be available for issuance, which will increase the aggregate number of shares authorized for issuance pursuant to awards issued under the Amended and Restated 2021 Incentive Plan to 6,123,000 shares plus the Carryover Shares, subject to certain adjustments as set forth in the Amended and Restated 2021 Incentive Plan.

Impact on Dilution and Fully-Diluted Overhang

Our Board recognizes the impact of dilution on our shareholders and has evaluated this share request carefully in the context of the need to motivate, retain and ensure that our leadership team is focused on our strategic and long-term growth priorities.

The following table sets forth certain information as of December 31, 2024, unless otherwise noted, with respect to the Company's equity compensation plans:

Stock options outstanding	827,458
Weighted-average exercise price of outstanding stock options	\$3.24
Weighted-average remaining contractual term of outstanding stock options	2.7 years
Restricted stock units outstanding (including restricted stock units subject to performance-based vesting)	2,313,848
Total shares available for grant	2,356,173
Additional shares being requested under the Amended and Restated 2021 Incentive Plan	3,923,000
Basic common shares outstanding as of the Record Date	44,213,746

As of December 31, 2024, 2,356,173 shares were available for future awards under the 2021 Incentive Plan. We refer to this amount as the Available Share Limit. From and after stockholder approval of the Amended and Restated 2021 Incentive Plan, the number of shares of common stock reserved for issuance under the 2021 Incentive Plan and the Available Share Limit will increase by 3,923,000 shares such that 6,279,173 shares will be available for future awards. The Available Share Limit may be increased by the number of shares forfeited and/or returned to the plan pursuant to awards granted prior to stockholder approval of the Amended and Restated 2021 Incentive Plan. Awards, if any, made under the 2021 Incentive Plan after December 31, 2024 will be subtracted from the Available Share Limit.

Our Board believes that the number of shares of common stock that would be available for issuance under the Amended and Restated 2021 Incentive Plan represents a reasonable amount of potential equity dilution given our strategic and long-term growth priorities.

Burn Rate

The following table sets forth information regarding our equity awards granted and performance-based equity awards earned over each of the last three fiscal years:

	2024	2023	2022
Stock options granted	-	-	-
Time-based restricted stock units granted	1,078,213	1,350,125	918,870
Performance-based restricted stock units earned (1)	51,732	316,210	401,308
Total awards granted	1,129,945	1,666,335	1,320,178
Weighted-average basic common shares outstanding	43,538,455	42,420,227	41,412,702
Annual burn rate	2.60%	3.93%	3.19%

- (1) With respect to performance-based RSUs in the table above, we calculate the share usage rate based on the applicable number of shares earned each year. For reference, the performance-based RSUs granted during the foregoing 3-year period were as follows: 375,895 shares in 2024, 558,958 shares in 2023 and 320,272 shares in 2022.

Expected Duration of the Share Reserve

If this proposal is approved by our shareholders, we expect that the share reserve under the Amended and Restated 2021 Incentive Plan will be sufficient for awards for one to two years. Expectations regarding future share usage could be impacted by a number of factors, such as the future performance of our stock price, award type mix, hiring and promotion activity at the executive level, the rate at which shares are returned to the Amended and Restated 2021 Incentive Plan's reserve upon the awards' expiration, forfeiture or cash settlement; the future performance of our stock price, and the consequences of acquiring other companies. While we believe that the assumptions we used are reasonable, future share usage may differ from current expectations.

Key Provisions

The following is a summary of the key provisions of the Amended and Restated 2021 Incentive Plan:

Plan Termination Date:	May 18, 2031
Eligible Participants:	Employees, officers, directors, consultants and advisors (except that only employees are eligible for Incentive Stock Options)
Shares Authorized:	The sum of (i) 6,123,000 shares plus (ii) the Carryover Shares, subject to certain adjustments as set forth in the Amended and Restated 2021 Incentive Plan
Award Types:	(1) Incentive Stock Options (2) Non-qualified Stock Options (3) Restricted Stock (4) Stock Appreciation Rights (5) Performance Bonus Awards (6) Deferred Stock (7) Restricted Stock Units (8) Dividend Equivalents (9) Performance Stock Units (10) Performance Share Awards (11) Other Stock-Based Awards
Vesting:	Determined by the Compensation Committee. Subject to the acceleration of vesting in certain circumstances as permitted under the terms of the Amended and Restated 2021 Incentive Plan, each award under the Amended and Restated 2021 Incentive Plan will have a minimum vesting period of one year, except under certain limited circumstances and with permitted exceptions up to 5% of the share reserve.
Not Permitted:	No discount stock options or stock appreciation rights No “liberal share recycling” of options or stock appreciation rights No payment of dividends or dividend equivalents on unvested awards No repricing of stock options and amendments that under the Internal Revenue Code (the “Code”) or Nasdaq rules require stockholder approval No “evergreen” share increases or automatic “reload” awards
Incentive Stock Option Limit:	No more than 2,000,000 shares may be issued pursuant to incentive stock options
Limitation on Number of Shares Granted to Non-Employee Directors:	The sum of the grant date fair market value of equity-based awards and the amount of any cash-based awards granted to a non-employee director during any calendar year, under the Amended and Restated 2021 Incentive Plan, may not exceed \$500,000

Awards under the Amended and Restated 2021 Incentive Plan

Stock Options. The Amended and Restated 2021 Incentive Plan permits the Compensation Committee to issue incentive stock options and non-qualified stock options to participants, which directly link their financial success to that of the Company’s stockholders. The Compensation Committee shall determine the number of shares subject to options and all other terms and conditions of the options, including vesting requirements. In no event, however, may the exercise price of a stock option be less than 100% of the fair market value of the Company’s common stock on the date of the stock option’s grant, nor may any option have a term of more than ten years. Except for adjustments based on changes in the corporate structure or as otherwise provided in the 2021 Incentive Plan, the terms of an option may not be amended to reduce the

exercise price nor may options be canceled or exchanged for cash, other awards or options with an exercise price that is less than the exercise price of the original options.

Additionally, in the case of an incentive stock option granted to any individual who, at the date of grant, owns stock possessing more than ten percent (10%) of the total combined voting power all classes of stock of the Company, such incentive stock option shall be granted at a price that is not less than one hundred and ten percent (110%) of fair market value on the date of grant and such incentive stock option shall be exercisable for no more than five (5) years from the date of grant.

Stock Appreciation Rights. The Amended and Restated 2021 Incentive Plan permits the Compensation Committee to issue stock appreciation rights (“SARs”), either free-standing or in tandem with stock options. The Compensation Committee shall determine the number of SARs to be granted and other terms and conditions of the SARs. In no event, however, may the exercise of a SAR be less than 100% of the fair market value of the Company’s common stock on the date of grant, and the terms shall not exceed ten years. SARs may be settled in cash, stock, or a combination of both.

Restricted Stock and Restricted Stock Units. The Amended and Restated 2021 Incentive Plan permits the Compensation Committee to grant restricted stock awards. Each share of restricted stock shall be subject to such terms, conditions, restrictions, and/or limitations, if any, as the Compensation Committee deems appropriate, including, but not by way of limitation, restrictions on transferability and continued employment. Holders of shares of restricted stock may vote the shares and receive dividends on such shares. Notwithstanding the foregoing, with respect to a share of restricted stock, dividends shall only be paid out to the extent that the share of restricted stock vests. The vesting period for restricted stock shall be determined by the Compensation Committee, which may accelerate the vesting of any such award. The Compensation Committee may also grant restricted stock units, which have substantially the same terms as restricted stock, except that units have no voting rights, and unless otherwise determined by the Compensation Committee, will not receive dividends or dividend equivalents (which in an event shall only be paid out to the extent that the restricted stock units vest). The Compensation Committee may also grant unrestricted stock under this provision.

Performance Shares and Performance Stock Units. The Amended and Restated 2021 Incentive Plan permits the Compensation Committee to issue “performance shares” and “performance stock units.” These are contingent incentive awards that are converted into stock and/or cash and paid out to the participant only if specific performance goals are achieved over performance periods, as set by the Compensation Committee. If the performance goals are not achieved, the awards are canceled or reduced. Performance shares are each equivalent in value to a share of common stock (payable in cash and/or stock), while performance stock units are equal to a specific amount of cash.

Stock Payments and Other Stock-Based Awards. The Amended and Restated 2021 Incentive Plan also permits the Compensation Committee to grant awards of deferred stock, dividend equivalents, other stock-based awards, and performance bonus awards as provided in the Amended and Restated 2021 Incentive Plan.

Eligible for Participation. Persons eligible to participate in the Amended and Restated 2021 Incentive Plan include employees, directors, consultants and advisors, as determined by the Compensation Committee. Approximately 355 employees and 4 nonemployee directors currently are eligible to participate in the 2021 Incentive Plan.

Available Shares. The Amended and Restated 2021 Incentive Plan authorizes the issuance of an aggregate number of shares of common stock equal to the sum of (i) 6,123,000 shares plus (ii) the number of shares available for grant under the Prior Plan as of May 18, 2021, subject to certain adjustments as set forth in the Amended and Restated 2021 Incentive Plan.

If an outstanding award under the Amended and Restated 2021 Incentive Plan expires or is terminated or canceled for any reason without having been exercised or settled in full, or if shares acquired pursuant to an award subject to forfeiture are forfeited under the Amended and Restated 2021 Incentive Plan, the shares allocable to the terminated portion of such award or such forfeited shares shall again be available for issuance under the Amended and Restated 2021 Incentive Plan. Shares shall not be deemed to have been issued pursuant to the Amended and Restated 2021 Incentive Plan with respect to any portion of an award that is settled in cash. In the event that withholding tax liabilities arising from a full-value award (i.e., an award other than an option or stock appreciation right) or, after May 18, 2021, arising from a full-value award under the Prior Plan, are satisfied by the delivery or withholding of shares, the shares so tendered or withheld shall be added to the 2021 Incentive Plan’s reserve.

Notwithstanding anything to the contrary, the following shares shall not again be made available for issuance or delivery under the Amended and Restated 2021 Incentive Plan: (i) shares tendered in payment of an option; (ii) shares delivered or withheld by the Company to satisfy any tax withholding obligation with respect to an option or stock appreciation right; (iii) shares covered by a stock-settled stock appreciation right that were not issued upon the settlement of the stock appreciation right; or (iv) shares purchased on the open market with option proceeds.

In the event of merger, reorganization, consolidation, recapitalization, separation, split-up, liquidation, share combination, stock split, stock dividend, an extraordinary cash distribution on stock, a corporate separation or other reorganization or liquidation or other change in the corporate or capital structure of the Company, as described in the Amended and Restated 2021 Incentive Plan, affecting the shares that may be issued under the Amended and Restated 2021 Incentive Plan, an adjustment shall be made in the number and class of shares which may be delivered under the Amended and Restated 2021 Incentive Plan (including but not limited to individual grant limits). Upon termination of the Amended and Restated 2021 Incentive Plan, no further awards may be issued under the Amended and Restated 2021 Incentive Plan.

Minimum Vesting. Subject to the acceleration of vesting in certain circumstances as permitted under the terms of the Amended and Restated 2021 Incentive Plan, each award under the Amended and Restated 2021 Incentive Plan will have a minimum vesting period of one year, except that awards to non-employee Directors that vest on the earlier of the one-year anniversary of the date of grant and the next annual meeting of stockholders which is at least 50 weeks after the immediately preceding year's annual meeting shall not be subject to such minimum vesting requirements, and the Compensation Committee may determine in its discretion that up to 5% of the shares of common stock which may be issued under the 2021 Incentive Plan may be granted free of such minimum vesting provisions.

Dividends and Dividend Equivalents. With respect to any award that provides for or includes a right to dividends or dividend equivalents, if dividends are declared during the period that an equity award is outstanding, such dividends (or dividend equivalents) shall either (a) not be paid or credited with respect to such award or (b) be accumulated but remain subject to vesting requirement(s) to the same extent as the applicable award and shall only be paid at the time or times such vesting requirement(s) are satisfied. A participant holding an option or stock appreciation right is not eligible to receive dividends or dividend equivalents.

Clawback and Reimbursement of Company for Unearned or Ill-gotten Gains. Any amounts paid under the Amended and Restated 2021 Incentive Plan shall be subject to recoupment in accordance with The Dodd-Frank Wall Street Reform and Consumer Protection Act and any implementing regulations thereunder, any "clawback" policy adopted by the Company or as is otherwise required by applicable law or stock exchange listing condition.

Awards under the Amended and Restated 2021 Incentive Plan shall be subject to the Company's clawback policy, as in effect from time to time. If there shall be no such clawback policy in effect, (1) awards under the Plan and any Shares issued pursuant to awards under the Amended and Restated 2021 Incentive Plan (and any gains thereon) shall be subject to recovery or "clawback" by the Company if and to the extent that the vesting of such awards was determined or calculated based on materially inaccurate financial statements or any other material inaccurate performance metric criteria; or (2) if the Company or its Subsidiaries terminate a participant's service relationship due to the participant's gross negligence or willful misconduct, or determine there are grounds for such a termination (whether or not such actions also constitute "cause" under an award agreement), any awards under the Amended and Restated 2021 Incentive Plan, whether or not vested, as well as any shares of Stock issued pursuant to awards under Amended and Restated 2021 Incentive Plan (and any gains thereon) shall be subject to forfeiture, recovery and "clawback." Notwithstanding anything to the contrary contained herein, if a participant has engaged in any detrimental activity (including noncompliance with restrictive covenants), as determined by the Committee, the Committee may, in its sole discretion, provide for cancellation of any or all of such participant's outstanding awards and/or forfeiture by the participant of any gain realized in respect of awards, and repayment of any such gain promptly to the Company.

The Amended and Restated 2021 Incentive Plan also provides that, unless otherwise specifically provided in an award agreement, and to the extent permitted by applicable law, if the Company is required to prepare an accounting restatement due to the material noncompliance of the Company with any financial reporting requirement under the securities laws, the Compensation Committee may, without obtaining the approval or consent of the Company's shareholders or of any participant, require that any participant who personally engaged in one of more acts of fraud or misconduct that have caused or partially caused the need for such restatement or any current or former chief executive officer, chief financial officer, or executive officer, regardless of their conduct, to reimburse the Company in a manner consistent with Section 409A of the Code, if the award constitutes "Non-Qualified Deferred Compensation," for all or any portion of any awards granted or settled under the Amended and Restated 2021 Incentive Plan, or the Compensation Committee may require the termination or rescission of, or the recapture associated with, any award, in excess of the amount the participant would have received under the accounting restatement.

Performance Awards. Subject to the general purposes, terms and conditions of the Amended and Restated 2021 Incentive Plan and applicable law, and under the direction of the Board, the Compensation Committee shall have complete control over the administration of the Amended and Restated 2021 Incentive Plan and shall have full authority to grant awards and determine who shall receive awards, when such awards shall be granted and the terms and conditions of such awards, including, but not limited to, conditioning the exercise, vesting, payout or other term of condition of an award on the achievement of performance goals. Such performance goals shall be based on the attainment of specified levels of one or more of the following: (i) earnings per share; (ii) sales; (iii) operating income; (iv) gross income; (v) basic or adjusted net income (before or after taxes); (vi) cash flow; (vii) gross profit; (viii) gross or operating margin; (ix) working capital; (x) earnings before interest and taxes; (xi) earnings before interest, tax, depreciation and amortization; (xii) return measures, including return on invested capital, sales, assets, or equity; (xiii) revenues; (xiv) market share; (xv) the price or increase in price of common stock; (xvi) total shareholder return; (xvii) economic value created or added; (xviii) expense reduction; (xix) implementation or completion of critical projects, including acquisitions, divestitures, and other strategic objectives, including market penetration and product development; or (xx) specified objectives with regard to limiting the level of increase in all or a portion of the Company's bank debt or other long-term or short-term public or private debt or other similar financial obligations of the Company; and any other metric that may be determined by the Committee. Such performance goals also may be based solely by reference to the Company's performance or the performance of a subsidiary, division, business segment or business unit of the Company or a subsidiary, or based upon performance relative to performance of other companies or upon comparisons of any of the indicators of performance relative to performance of other companies.

Other Information. The Amended and Restated 2021 Incentive Plan may be amended in whole or in part by the Board or the Compensation Committee with the approval of the Board and in certain circumstances with stockholder approval. Unless the Compensation Committee provides otherwise in advance of the grant, in the event of a Change in Control (as defined in the Amended and Restated 2021 Incentive Plan), if the employee is terminated other than for "cause" within one year of a Change in Control, options and restricted stock (including restricted stock units) shall vest.

Tax Aspects Under the Code

The following summary is intended only as a general guide to the U.S. federal income tax consequences under current law of equity-based awards that may be granted under the Amended and Restated 2021 Incentive Plan. It does not attempt to describe all possible federal or other tax consequences of participation in the Amended and Restated 2021 Incentive Plan or tax consequences based on particular circumstances. The exact federal income tax treatment of transactions under the Amended and Restated 2021 Incentive Plan will vary depending upon the specific facts and circumstances involved and participants are advised to consult their personal tax advisors with regard to all consequences arising from the grant or exercise of awards and the disposition of any acquired shares.

Incentive Stock Options. Incentive stock options under the Amended and Restated 2021 Incentive Plan are intended to be eligible for the favorable tax treatment accorded "incentive stock options" under the Code. There generally are no federal income tax consequences to the participant or the Company by reason of the grant or exercise of an incentive stock option. However, the exercise of an incentive stock option may increase the participant's alternative minimum tax liability, if any.

If a participant holds stock acquired through exercise of an incentive stock option for at least two (2) years from the date on which the option is granted and at least one (1) year from the date on which the shares are transferred to the participant upon exercise of the option, any gain or loss on a disposition of such stock will be treated for tax purposes as long-term capital gain or loss.

Generally, if the participant disposes of the stock before the expiration of either of these holding periods (a "disqualifying disposition"), then at the time of disposition the participant will recognize taxable ordinary income equal to the lesser of (a) the excess of the stock's fair market value on the date of exercise over the exercise price, or (b) the participant's actual gain, if any, on the purchase and sale. The participant's additional gain (or any loss) upon the disqualifying disposition will be a capital gain (or loss), which will be long-term or short-term depending on whether the stock was held for more than one (1) year.

To the extent the participant recognizes ordinary income by reason of a disqualifying disposition, the Company will generally be entitled to a corresponding business expense deduction in the tax year in which the disqualifying disposition occurs, subject to Section 162(m) of the Code.

Non-qualified Stock Options, Restricted Stock Awards, Restricted Stock Units, and Deferred Stock. Non-qualified stock options, restricted stock awards, restricted stock units and deferred stock granted under the Amended and Restated 2021 Incentive Plan generally have the following federal income tax consequences:

There are no tax consequences to the participant or the Company by reason of the grant of a non-qualified stock option. Upon exercise of the option, the participant ordinarily will recognize taxable ordinary income equal to the excess, if any, of the stock's fair market value on the exercise date over the exercise price. If the stock received pursuant to the exercise is subject to further vesting requirements, the taxable event will be delayed until the vesting restrictions lapse unless the participant elects under Section 83(b) of the Code to be taxed on receipt of the stock.

There are no tax consequences to the participant or the Company by reason of the grant of restricted stock, restricted stock units or deferred stock awards. The participant ordinarily will recognize taxable ordinary income equal to the excess, if any, of the stock's fair market value over the purchase price, if any, when such award vests. Under certain circumstances, the participant may be permitted to elect under Section 83(b) of the Code to be taxed on the grant date.

With respect to employees, the Company is generally required to withhold from regular wages or supplemental wage payments an amount based on the ordinary income recognized. The Company will generally be entitled to a business expense deduction equal to the taxable ordinary income realized by the participant, subject to Section 162(m) of the Code.

Upon disposition of the stock, the participant will generally recognize a capital gain or loss equal to the difference between the selling price and the sum of the amount paid for such stock (if any) plus any amount recognized as ordinary income upon acquisition (or vesting) of the stock. Such gain or loss will be long-term or short-term depending on whether the stock was held for more than one (1) year.

Stock Appreciation Rights. No taxable income is generally recognized upon the receipt of a SAR, but upon exercise of the SAR, the fair market value of the shares (or cash in lieu of shares) received generally will be taxable as ordinary income to the recipient in the year of such exercise. The Company generally will be entitled to a compensation deduction for the same amount which the recipient recognizes as ordinary income, subject to Section 162(m) of the Code.

Performance Awards. A participant who has been granted a performance award generally will not recognize taxable income at the time of grant, and the Company will not be entitled to a deduction at that time. When an award is paid, whether in cash or common shares, the participant generally will recognize ordinary income, and the Company will be entitled to a corresponding deduction, subject to Section 162(m) of the Code.

Stock Payments and Other Stock-Based Awards. A participant who receives a stock payment in lieu of a cash payment that would otherwise have been made will generally be taxed as if the cash payment has been received, and the Company generally will be entitled to a deduction for the same amount, subject to Section 162(m) of the Code.

Section 409A of the Code. Most of the awards under the Amended and Restated 2021 Incentive Plan are exempt from Section 409A of the Code. To the extent that any award hereunder could be subject to Section 409A of the Code, it will be structured to comply with Section 409A of the Code.

Section 162(m) of the Code. The Tax Reform and Jobs Act of 2017 eliminated the ability to deduct compensation qualifying for the "performance-based compensation" exception under Section 162(m) of the Code for tax years commencing after December 31, 2017. Section 162(m) of the Code imposes a \$1 million limit on the amount that a public company may deduct for compensation paid to anyone who has ever been the Company's chief executive officer, chief financial officer or one of the three highest compensated officers in any fiscal year beginning after December 31, 2016 (i.e., a "covered employee"). Changes made by the American Rescue Plan Act of 2021 expanded the reach of the section 162(m) deduction limitation, with the changes generally effective after 2026, to include the next five highest compensated employees for each taxable year, regardless of whether they are officers of the company. These additional highly compensated employees may change from year to year.

New Plan Benefits

It is not possible to determine specific amounts that may be awarded in the future under the Amended and Restated 2021 Incentive Plan because grants of awards under the Amended and Restated 2021 Incentive Plan are at the discretion of the Compensation Committee.

Please see the Summary Compensation Table and the Outstanding Equity Awards at Fiscal Year-End - 2024 Table for information with respect to awards previously granted to our individual named executive officers under the Prior Plan and the 2021 Incentive Plan. Please see the Director Compensation Table for awards previously granted to our non-employee directors.

SUBMISSION OF STOCKHOLDER PROPOSALS FOR THE 2026 ANNUAL MEETING

In order to be considered for inclusion in our proxy statement and form of proxy for our 2026 annual meeting, stockholder proposals intended to be presented at our 2026 annual meeting of stockholders must be received by us on or before December 24, 2025 and otherwise comply with the requirements set forth in Rule 14a-8 under the Exchange Act. These proposals must also comply with the rules of the SEC governing the form and content of proposals in order to be included in our proxy statement and form of proxy and should be mailed to: Secretary, Harvard Bioscience, Inc., 84 October Hill Road, Holliston, Massachusetts 01746.

To the extent a stockholder of record wishes to have a stockholder proposal or Director nomination considered at an annual meeting even though such proposal is not included in our proxy statement, our Bylaws provide that such stockholder of record must provide written notice of such proposal or nomination and appropriate supporting documentation, as set forth in the Bylaws, to our Secretary at our principal executive office not less than 90 days or not more than 120 days prior to the first anniversary of the date of the preceding year's annual meeting. For the 2026 annual meeting of stockholders, such proposal or nomination must be received no earlier than February 2, 2026 and no later than March 4, 2026.

In addition to the notice and information requirements contained in our Bylaws, to comply with the universal proxy rules, stockholders who intend to solicit proxies in support of director nominees other than the Company's nominees must provide notice that sets forth the information required by Rule 14a-19 under the Exchange Act no later than April 3, 2026.

MULTIPLE STOCKHOLDERS SHARING THE SAME ADDRESS

Owners of Common Stock in street name may receive a notice from their broker or bank stating that only one notice of internet availability of proxy materials, annual report or proxy statement will be delivered to multiple stockholders sharing an address. This practice, known as "householding," is designed to reduce printing and postage costs. However, if any stockholder residing at such an address wishes to receive a separate notice of internet availability of proxy materials, annual report or proxy statement, we will promptly deliver a separate copy to any stockholder upon written or oral request to our investor relations department at Harvard Bioscience, Inc., 84 October Hill Road, Holliston, Massachusetts 01746 or by telephone at (508) 893-3120 or by email at investors@harvardbioscience.com. In addition, any stockholder who receives multiple copies at the same address can request delivery of a single copy by notifying our investor relations department pursuant to the contact information provided above.

OTHER MATTERS

The Board of Directors does not know of any matters, other than those described in this proxy statement that will be presented for action at the Annual Meeting. If other matters are duly presented, proxies will be voted in accordance with the best judgment of the proxy holders.

YOUR VOTE IS IMPORTANT. WHETHER OR NOT YOU PLAN TO ATTEND THE ANNUAL MEETING VIRTUALLY, PLEASE CAST YOUR VOTE ONLINE, BY TELEPHONE OR BY COMPLETING, DATING, SIGNING AND PROMPTLY RETURNING YOUR PROXY CARD OR VOTING INSTRUCTIONS CARD IN THE POSTAGE-PAID ENVELOPE (WHICH WILL BE PROVIDED TO THOSE STOCKHOLDERS WHO REQUEST PAPER COPIES OF THESE MATERIALS BY MAIL) BEFORE THE ANNUAL MEETING SO THAT YOUR SHARES ARE REPRESENTED AT THE ANNUAL MEETING.

THIS PROXY STATEMENT IS ACCOMPANIED BY THE COMPANY'S ANNUAL REPORT. THE COMPANY WILL FURNISH, WITHOUT CHARGE, A COPY OF ITS ANNUAL REPORT AND ANY EXHIBITS THERETO TO ANY STOCKHOLDER, UPON WRITTEN REQUEST TO HARVARD BIOSCIENCE, INC., 84 OCTOBER HILL ROAD, HOLLISTON, MASSACHUSETTS 01746. A LIST OF STOCKHOLDERS ENTITLED TO VOTE AT THE ANNUAL MEETING WILL BE AVAILABLE FOR INSPECTION BY STOCKHOLDERS DURING REGULAR BUSINESS HOURS AT OUR OFFICES AND THE OFFICES OF OUR TRANSFER AGENT DURING THE TEN DAYS PRIOR TO THE ANNUAL MEETING AS WELL AS AT THE ANNUAL MEETING.

Annex A

Harvard Bioscience, Inc. Amended and Restated 2021 Incentive Plan

Article 1 Establishment and Purpose

1.1 Establishment of the Plan. The 2021 Incentive Plan (as amended from time-to-time, the “Plan”) was approved by the stockholders of Harvard Bioscience, Inc., a Delaware corporation (the “Company”) on May 18, 2021 (the “Effective Date”). The Board of Directors of the Company adopted this amendment and restatement of the Plan on April [], 2025, subject to approval by the Company’s stockholders.

1.2 Purpose of the Plan. The purposes of the Plan are to (a) enable the Company and any Affiliate to attract and retain the types of Employees, Consultants and Directors who will contribute to the Company’s long-range success; (b) provide incentives that align the interests of Employees, Consultants and Directors with those of shareholders of the Company; and (c) promote the success of the Company’s business.

1.3 Effective Date of the Amended and Restated 2021 Incentive Plan. The Plan, as amended and restated herein, is effective as of the date the Plan is approved by the Company’s stockholders. The Plan, as amended and restated herein, will be deemed to be approved by the stockholders if it receives the affirmative vote of the holders of a majority of the shares of stock of the Company present or represented and entitled to vote at a meeting duly held in accordance with the applicable provisions of the Company’s Bylaws.

1.4 Duration of the Plan. Unless sooner terminated as provided herein, the Plan shall terminate on May 18, 2031. After the Plan is terminated, no Awards may be granted but Awards previously granted shall remain outstanding in accordance with their applicable terms and conditions and the Plan’s terms and conditions.

Article 2 Definitions

Whenever used in the Plan, the following terms shall have the meanings set forth below and, when the meaning is intended, the initial letter of the word is capitalized:

2.1 “Affiliate” means, with respect to any Person, any other Person that directly or indirectly through one or more intermediaries controls, is controlled by or is under common control with, the Person in question, including any subsidiary. As used herein, the term “control” means the possession, direct or indirect, of the power to direct or cause the direction of the management and policies of a Person, whether through ownership of voting securities, by contract or otherwise. As used herein, the term “subsidiary” means any corporation, partnership, venture or other entity in which the Company holds, directly or indirectly, a fifty percent (50%) or greater ownership interest.

2.2 “Applicable Law” means any applicable law, including without limitation: (a) provisions of the Code, the Securities Act, the Exchange Act and any rules or regulations thereunder; (b) corporate, securities, tax or other laws, statutes, rules, requirements or regulations, whether federal, state, local or foreign; and (c) rules of any securities exchange or automated quotation system on which the Shares are listed, quoted or traded.

2.3 “Award” means, individually or collectively, a grant or award under this Plan of Options, Stock Appreciation Rights, Restricted Stock (including unrestricted Stock), Restricted Stock Units, Performance Stock Units, Performance Shares, Deferred Stock Awards, Other Stock-Based Awards, Dividend Equivalent Awards and Performance Bonus Awards, in each case subject to the terms of the Plan.

2.4 “Award Agreement” means an agreement, certificate, resolution or other type or form of writing or other evidence approved by the Committee which sets forth the terms and conditions of an Award. An Award Agreement may be in any electronic medium, may be limited to a notation on the books and records of the Company and, with the approval of the Committee, need not be signed by a representative of the Company or a Participant. In the event of any inconsistency between the Plan and an Award Agreement, the terms of the Plan shall govern.

2.5 “Beneficial Owner” or “Beneficial Ownership” has the meaning ascribed to such term in Rule 13d-3 and Rule 13d-5 under the Exchange Act.

2.6 “Board” or “Board of Directors” means the Company’s Board of Directors.

2.7 “Cause” means, except as otherwise defined in an Award Agreement, a Participant’s: (a) conviction of, or the entry of a plea of guilty or no contest to, a felony or any other crime that causes the Company or its Affiliates public disgrace or disrepute, or materially and adversely affects the Company’s or its Affiliates’ operations or financial performance or the relationship the Company has with its customers; (b) gross negligence or willful misconduct with respect to the Company or any of its Affiliates, including, without limitation fraud, embezzlement, theft or proven dishonesty in the course of his or her employment or other service; (c) refusal to perform any lawful, material obligation or fulfill any duty (other than any duty or obligation of the type described in clause (e) below) to the Company or its Affiliates (other than due to a Disability), which refusal, if curable, is not cured within fifteen (15) days after delivery of written notice thereof; (d) material breach of any agreement with or duty owed to the Company or any of its Affiliates, which breach, if curable, is not cured within fifteen (15) days after the delivery of written notice thereof; or (e) any breach of any obligation or duty to the Company or any of its Affiliates (whether arising by statute, common law or agreement) relating to confidentiality, noncompetition, nonsolicitation or proprietary rights. Notwithstanding the foregoing, if a Participant and the Company (or any of its Affiliates) have entered into an employment agreement, consulting agreement or other similar agreement that specifically defines “cause,” then with respect to such Participant, “Cause” shall have the meaning defined in that employment agreement, consulting agreement or other agreement.

2.8 “Change in Control” shall be deemed to have occurred if:

(a) any Person, other than a trustee or other fiduciary holding securities under an employee benefit plan of the Company or a corporation owned directly or indirectly by the stockholders of the Company in substantially the same proportions as their ownership of stock of the Company, becomes the Beneficial Owner, directly or indirectly, of securities of the Company representing fifty percent (50%) or more of the total voting power represented by the Company’s then outstanding voting securities;

(b) during any period of two (2) consecutive years, individuals who at the beginning of such period constitute the Board of Directors of the Company and any new Director whose election by the Board of Directors or nomination for election by the Company’s stockholders was approved by a vote of a majority of the Directors then still in office who either were Directors at the beginning of the period or whose election or nomination for election was previously so approved, cease for any reason to constitute a majority thereof, provided that this does not apply to a Director whose initial assumption of office during the lookback period is in connection with an actual or threatened election contest, including but not limited to a consent solicitation, relating to the election of Directors of the Company;

(c) the consummation of a merger or consolidation of the Company with any other business entity, other than a merger or consolidation which would result in the voting securities of the Company outstanding immediately prior thereto continuing to represent (either by remaining outstanding or by being converted into voting securities of the surviving entity) at least fifty percent (50%) of the total voting power represented by the voting securities of the Company or such surviving entity outstanding immediately after such merger or consolidation;

(d) the stockholders of the Company approve a plan of complete liquidation of the Company or an agreement for the sale or disposition by the Company of all or substantially all the Company’s assets; or

(e) consummation of the sale or disposition by the Company of all or substantially all of the Company’s assets.

Notwithstanding the foregoing, if a Change in Control constitutes a payment event with respect to any Award (or any portion of an Award) that provides for the deferral of compensation that is subject to Section 409A of the Code, to the extent required to avoid the imposition of additional taxes under Section 409A of the Code, the transaction or event described in subsection (a), (b), (c) or (d) with respect to such Award (or portion thereof) shall only constitute a Change in Control for purposes of the payment timing of such Award if such transaction also constitutes a “change in control event,” as defined in Treasury Regulation Section 1.409A-3(i)(5).

The Committee shall have full and final authority, which shall be exercised in its sole discretion, to determine conclusively whether a Change in Control has occurred pursuant to the above definition, the date of the occurrence of such Change in Control and any incidental matters relating thereto; provided that any exercise of authority in conjunction with a determination of whether a Change in Control is a “change in control event” as defined in Treasury Regulation Section 1.409A-3(i)(5) shall be consistent with such regulation.

2.9 “Code” means the Internal Revenue Code of 1986, as amended from time to time, and the Treasury Regulations issued thereunder.

2.10 “Committee” has the meaning set forth in Section 3.1.

2.11 “Company” has the meaning set forth in Section 1.1.

2.12 “Consultant” means any individual or entity who renders bona fide services to the Company or an Affiliate, other than as an Employee or Director, provided that such services are not in connection with the offer or sale of securities in a capital-raising transaction and do not, directly or indirectly, promote or maintain a market for the Company’s or its Affiliates’ securities.

2.13 “Deferred Stock” means a right to receive a specified number of shares of Stock during specified time periods pursuant to Article 9.

2.14 “Director” means a member of the Board.

2.15 “Disability” means, unless otherwise determined by the Committee or determined in the applicable Award Agreement, that the Participant is unable to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment; provided, however, that to entitle a Participant to an extended exercise period for an Incentive Stock Option, the Participant must be described in Section 22(e)(3) of the Code. Notwithstanding the foregoing, for Awards subject to Section 409A of the Code, Disability shall mean that a Participant is disabled under Section 409A(a)(2)(C)(i) or (ii) of the Code. Notwithstanding the above, the Committee may rely on any determination that a Participant is disabled for purposes of benefits under any long-term disability plan maintained by the Company or any Affiliate in which a Participant participates.

2.16 “Dividend Equivalent” means a right granted to a Participant pursuant to Article 9 to receive the equivalent value (in cash or Stock) of dividends paid on Stock.

2.17 “Effective Date” has the meaning set forth in Section 1.1.

2.18 “Eligible Person” means any person who is an employee, officer, director, consultant, advisor or other individual service provider of the Company or any Affiliate, or any person who is determined by the Committee to be a prospective employee, officer, director, consultant, advisor or other individual service provider of the Company or any Affiliate.

2.19 “Employee” means any person employed by the Company, its Affiliates and/or Subsidiaries; provided, that, for purposes of determining eligibility to receive Incentive Stock Options, an Employee shall mean an employee of the Company or a parent or subsidiary corporation within the meaning of Section 424 of the Code. Mere service as a Director or payment of a director’s fee by the Company or an Affiliate shall not be sufficient to constitute “employment” by the Company or an Affiliate.

2.20 “Exchange Act” means the Securities Exchange Act of 1934, as amended from time to time, or any successor act thereto.

2.21 “Exercise Price” means the price at which a Share may be purchased by a Participant pursuant to an Option, as determined by the Committee.

2.22 “Fair Market Value” or “FMV” means, as of any date, unless otherwise determined by the Committee or determined in an applicable Award Agreement, the value of Stock determined as follows:

(a) If the Stock is listed on one or more established stock exchanges or national market systems, including without limitation, The NASDAQ Global Select Market, The NASDAQ Global Market or The NASDAQ Capital Market of The NASDAQ Stock Market LLC, its Fair Market Value shall be the closing sales price for such Stock (or the closing bid, if no sales were reported) as quoted on the principal exchange or system on which the Stock is listed (as determined by the Committee) on the date of determination (or, if no closing sales price or closing bid was reported on that date, as applicable, on the last immediately preceding trading date such closing sales price or closing bid was reported), as reported in *The Wall Street Journal* or such other source as the Committee deems reliable;

(b) If the Stock is regularly quoted on an automated quotation system (including the OTC Bulletin Board) or by a recognized securities dealer, its Fair Market Value shall be the closing sales price for such Stock as quoted on such system or by such securities dealer on the date of determination, but if selling prices are not reported, the Fair Market Value of a share of Stock shall be the mean between the high bid and low asked prices for the Stock on the date of determination (or, if no such prices were reported on that date, on the last date such prices were reported), as reported in *The Wall Street Journal* or such other source as the Committee deems reliable; or

(c) In the absence of an established market for the Stock of the type described in (a) and (b), above, the Fair Market Value thereof shall be determined by the Committee in good faith using any reasonable method of valuation, which method may be set forth with greater specificity in the Award Agreement, (and, to the extent necessary or advisable, in a manner consistent with Section 409A of the Code and Section 422 of the Code for Incentive Stock Options), which determination shall be conclusive and binding on all interested parties. Such reasonable method may be determined by reference to (i) the placing price of the latest private placement of the Shares and the development of the Company’s business operations and the general economic and market conditions since such latest private placement; (ii) other third party transactions involving the Shares and the development of the Company’s business operation and the general economic and market conditions since such sale; (iii) an independent valuation of the Shares (by a qualified valuation expert); or (iv) such other methodologies or information as the Committee determines to be indicative of Fair Market Value.

2.23 “Incentive Stock Option” means an Option that is intended to qualify as an “incentive stock option” within the meaning of Section 422 of the Code and that meets the requirements set out in the Plan.

2.24 “Insider” means an individual who is, on the relevant date, an officer, director, or ten percent (10%) beneficial owner of the Company, as those terms are defined under Section 16 of the Exchange Act, who is required to file reports pursuant to Rule 16a-3 under the Exchange Act.

2.25 “Non-Employee Director” means a member of the Board who is not an Employee of the Company.

2.26 “Non-Qualified Stock Option” means an Option that, by its terms, does not qualify or is not intended to qualify as an Incentive Stock Option.

2.27 “Option” means the right to purchase Stock granted to a Participant in accordance with Article 6. Options granted under the Plan may be Non-Qualified Stock Options, Incentive Stock Options or a combination thereof.

2.28 “Other Stock-Based Award” means an equity-based or equity-related Award not otherwise described by the terms of the Plan, granted pursuant to Article 9.

2.29 “Participant” means an Eligible Person to whom an Award is granted under the Plan or, if applicable, such other person who holds an outstanding Award.

2.30 “Performance Goal” means any goals established by the Committee pursuant to an Award, which may be based on the attainment of specified levels of one or more of the following: (i) earnings per share; (ii) sales; (iii) operating income; (iv) gross income; (v) basic or adjusted net income (before or after taxes); (vi) cash flow; (vii) gross profit; (viii) gross or operating margin; (ix) working capital; (x) earnings before interest and taxes; (xi) earnings before interest, tax, depreciation and amortization; (xii) return measures, including return on invested capital, sales, assets, or equity; (xiii) revenues; (xiv) market share; (xv) the price or increase in price of Stock; (xvi) total shareholder return; (xvii) economic value created or added; (xviii) expense reduction; (xix) implementation or completion of critical projects, including acquisitions, divestitures, and other strategic objectives, including market penetration and product development; (xx) specified objectives with regard to limiting the level of increase in all or a portion of the Company's bank debt or other long-term or short-term public or private debt or other similar financial obligations of the Company; or (xxi) any other metric that may be determined by the Committee. Such performance goals also may be based solely by reference to the Company's performance or the performance of a Subsidiary, division, business segment or business unit of the Company or a Subsidiary, or based upon performance relative to performance of other companies or upon comparisons of any of the indicators of performance relative to performance of other companies. The Committee may provide for exclusion of the impact of an event or occurrence which the Committee determines should appropriately be excluded, including (a) restructurings, discontinued operations, extraordinary items, and other unusual, infrequently occurring or non-recurring charges or events, (b) asset write-downs, (c) litigation or claim judgments or settlements, (d) acquisitions or divestitures, (e) reorganization or change in the corporate structure or capital structure of the Company, (f) an event either not directly related to the operations of the Company, Subsidiary, division, business segment or business unit or not within the reasonable control of management, (g) foreign exchange gains and losses, (h) a change in the fiscal year of the Company, (i) the refinancing or repurchase of bank loans or debt securities, (j), unbudgeted capital expenditures, (k) the issuance or repurchase of equity securities and other changes in the number of outstanding shares, (l) conversion of some or all of convertible securities to common stock, (m) any business interruption event (n) the cumulative effects of tax or accounting changes in accordance with U.S. generally accepted accounting principles, or (o) the effect of changes in other laws or regulatory rules affecting reported results. The Committee may adjust upwards or downwards the amount payable pursuant to such performance-based Award, and the Committee shall certify the amount of any such Award for the applicable performance period before payment is made.

2.31 “Performance Period” means one or more periods of time, which may be of varying and overlapping durations, as the Committee may select, over which the attainment of one or more Performance Goals will be measured for the purpose of determining a Participant's right to, and the payment of, Performance Stock Units and Performance Shares.

2.32 “Performance Stock Unit” and “Performance Share” each mean an Award granted to an Employee pursuant to Article 9 herein.

2.33 “Permitted Transferee” shall mean, with respect to a Participant, any “family member” of the Participant, as defined in the General Instructions to Form S-8 Registration Statement under the Securities Act (or any successor form thereto), or to any other transferee specifically approved by the Committee after taking into account Applicable Law, but excluding any third-party financial institutions.

2.34 “Person” has the meaning ascribed to such term in Section 3(a)(9) of the Exchange Act and used in Sections 13(d) and 14(d) thereof, including a “group” as defined in Section 13(d) thereof.

2.35 “Plan” means this Harvard Bioscience, Inc. 2021 Incentive Plan, as it may be amended from time to time.

2.36 “Prior Plan” means the 2000 Stock Option and Incentive Plan.

2.37 “Restricted Stock” means Stock awarded to a Participant pursuant to Article 8 as to which the Restriction Period has not lapsed.

2.38 “Restricted Stock Unit” means an Award granted pursuant to Section 8.9 as to which the Restriction Period has not lapsed.

2.39 “Restriction Period” means the period when Restricted Stock or Restricted Stock Units are subject to a “substantial risk of forfeiture” within the meaning of Section 83 of the Code (based on the passage of time, the achievement of performance goals, or upon the occurrence of other events as determined by the Committee, in its discretion), as provided in Article 8.

2.40 “Securities Act” means the Securities Act of 1933, as amended.

2.41 “Share” means a share of Stock of the Company.

2.42 “Stock” means the common stock of the Company, par value \$0.01 per share.

2.43 “Stock Appreciation Right” or “SAR” means a right granted pursuant to Article 7 to receive an amount payable in cash or Shares equal to the excess of (a) the Fair Market Value of a specified number of Shares on the date the SAR is exercised over (b) the Fair Market Value of such Shares on the date the SAR was granted as set forth in the applicable Award Agreement.

2.44 “Subsidiary” means any corporation, partnership, venture, unincorporated association or other entity in which the Company holds, directly or indirectly, a fifty percent (50%) or greater ownership interest, provided, however, that with respect to an Incentive Stock Option, a Subsidiary must be a corporation. The Committee may, at its sole discretion, designate, on such terms and conditions as the Committee shall determine, any other corporation, partnership, limited liability company, venture, or other entity a Subsidiary for purposes of this Plan.

2.45 “Ten Percent Owner” means a person who owns, or is deemed within the meaning of Section 424(d) of the Code to own, stock possessing more than 10% of the total combined voting power of all classes of stock of the Company (or any parent or subsidiary corporations of the Company, as defined in Sections 424(e) and (f), respectively, of the Code). Whether a person is a Ten Percent Owner shall be determined with respect to an Option based on the facts existing immediately prior to the grant date of the Option.

2.46 “Termination of Employment” or a similar reference means the event where the Employee is no longer an Employee of the Company or of any Subsidiary, including but not limited to where the employing company ceases to be a Subsidiary. With respect to any Participant who is not an Employee, “Termination of Employment” shall mean cessation of the performance of services. With respect to any Award that provides “non-qualified deferred compensation” within the meaning of Section 409A of the Code, “Termination of Employment” shall mean a “separation from service” as defined under Section 409A of the Code. Military or sick leave or other bona fide leave shall not be deemed a termination of employment, provided that it does not exceed the longer of three (3) months or the period during which the absent Participant’s reemployment rights, if any, are guaranteed by statute or by contract.

2.47 “Treasury Regulation” or “Treas. Reg.” means any regulation promulgated under the Code, as such regulation may be amended from time to time.

Article 3 Administration

3.1 The Committee. Except as otherwise provided herein, the Plan shall be administered by the Compensation Committee of the Board (the “Committee”). Unless otherwise determined by the Board, the Committee shall consist solely of two or more members of the Board each of whom is (a) a “non-employee director” within the meaning of Rule 16b-3 of the Exchange Act, and (b) an “independent director” under the rules of the Nasdaq Capital Market (or any similar rule or listing requirement that may be applicable to the Company from time to time); provided, that any action taken by the Committee shall be valid and effective, whether or not members of the Committee at the time of such action are later determined not to have satisfied the requirements for membership set forth in this Section 3.1 or otherwise provided in any charter of the Committee. Notwithstanding the foregoing: (a) the full Board, acting by a majority of its members in office or by designation to a Committee, shall conduct the general administration of the Plan with respect to all Awards granted to Non-Employee Directors and for purposes of such Awards the term “Committee” as used in this Plan shall be deemed to refer to the Board and (b) the Committee may delegate its authority hereunder to the extent permitted by Section 3.4. In its sole discretion, the Board may at any time and from time to time exercise any and all rights and duties of the Committee under the Plan except with respect to matters which under Rule 16b-3 under the Exchange Act, or any regulations or rules issued thereunder, are required to be determined in the sole discretion of the Committee. Except as may otherwise be provided in any charter of the Committee, appointment of Committee members shall be effective upon acceptance of

appointment; Committee members may resign at any time by delivering written notice to the Board; and vacancies in the Committee may only be filled by the Board.

3.2 Authority of the Committee. Subject to the general purposes, terms and conditions of this Plan and Applicable Law, and to the direction of the Board, the Committee shall have complete control over the administration of the Plan and shall have full authority to (a) exercise all of the powers granted to it under the Plan, (b) construe, interpret and implement the Plan, grant terms and grant notices, and all Award Agreements, (c) prescribe, amend and rescind rules and regulations relating to the Plan, including rules governing its own operations, (d) make all determinations necessary or advisable in administering the Plan, (e) correct any defect, supply any omission and reconcile any inconsistency in the Plan, (f) amend the Plan to reflect changes in applicable law (whether or not the rights of the holder of any Award are adversely affected, unless otherwise provided by the Committee), (g) grant Awards and determine who shall receive Awards, when such Awards shall be granted and the terms and conditions of such Awards, including, but not limited to, conditioning the exercise, vesting, payout or other term of condition of an Award on the achievement of Performance Goals, (h) unless otherwise provided by the Committee, amend any outstanding Award in any respect, not materially adverse to the Participant, including, without limitation, to (i) accelerate the time or times at which the Award becomes vested, unrestricted or may be exercised (and, in connection with such acceleration, the Committee may provide that any Shares acquired pursuant to such Award shall be restricted Shares, which are subject to vesting, transfer, forfeiture or repayment provisions similar to those in the Participant's underlying Award), provided, however, that any accelerated vesting is subject to stockholder approval, (ii) accelerate the time or times at which Shares are delivered under the Award (and, without limitation on the Committee's rights, in connection with such acceleration, the Committee may provide that any shares of Stock delivered pursuant to such Award shall be Restricted Shares, which are subject to vesting, transfer, forfeiture or repayment provisions similar to those in the Participant's underlying Award), or (iii) waive or amend any goals, restrictions or conditions applicable to such Award, or impose new goals, restrictions and (i) determine at any time whether, to what extent and under what circumstances and method or methods (i) Awards may be (A) settled in cash, Shares, other securities, other Awards or other property (in which event, the Committee may specify what other effects such settlement will have on the Participant's Award), (B) exercised or (C) canceled, forfeited or suspended, (ii) Shares, other securities, cash, other Awards or other property and other amounts payable with respect to an Award may be deferred either automatically or at the election of the Participant or of the Committee, or (iii) Awards may be settled by the Company or any of its Subsidiaries or any of its or their designees.

No Award may be made under the Plan after the tenth (10th) anniversary of the Effective Date.

3.3 Committee Decisions Final. The act or determination of a majority of the Committee shall be the act or determination of the Committee and any decision reduced to writing and signed by all of the members of the Committee shall be fully effective as if it had been made by a majority at a meeting duly held. The Committee may employ attorneys, consultants, accountants, agents, and other persons, any of whom may be an Employee, and the Committee, the Company, and its officers and Directors shall be entitled to rely upon the advice, opinions, or valuations of any such persons. All actions taken and all interpretations and determinations made by the Committee pursuant to the provisions of the Plan and all related orders or resolutions shall be final and binding upon the Participants, the Company, and all other interested persons, including but not limited to the Company, its stockholders, Employees, Participants, and their estates and beneficiaries.

3.4 Delegation of Authority. The Board or Committee may from time to time delegate to a committee of one or more members of the Board or one or more officers of the Company the authority to grant or amend Awards or to take other administrative actions pursuant to this Article 3; provided, however, that in no event shall an officer of the Company be delegated the authority to grant Awards to, or amend Awards held by, the following individuals: (a) individuals who are subject to Section 16 of the Exchange Act, or (b) officers of the Company (or Directors) to whom authority to grant or amend Awards has been delegated hereunder; provided, further, that any delegation of administrative authority shall only be permitted to the extent it is permissible under the Company's Certificate of Incorporation, Bylaws and Applicable Law. Any delegation hereunder shall be subject to the restrictions and limits that the Board or Committee specifies at the time of such delegation or that are otherwise included in the applicable Organizational Documents, and the Board or Committee, as applicable, may at any time rescind the authority so delegated or appoint a new delegatee. At all times, the delegatee appointed under this Section 3.4 shall serve in such capacity at the pleasure of the Board or the Committee, as applicable, and the Board or the Committee may abolish any committee at any time and re-vest in itself any previously delegated authority.

3.5 Indemnification. To the extent allowable pursuant to applicable law, each member of the Committee or of the Board shall be indemnified and held harmless by the Company from any loss, cost, liability, or expense that may be imposed upon or reasonably incurred by such member in connection with or resulting from any claim, action, suit, or proceeding to which he or she may be a party or in which he or she may be involved by reason of any action or failure to act pursuant to the Plan and against and from any and all amounts paid by him or her in satisfaction of judgment in such action, suit, or proceeding against him or her; provided he or she gives the Company an opportunity, at its own expense, to handle and defend the same before he or she undertakes to handle and defend it on his or her own behalf. The foregoing right of indemnification shall not be exclusive of any other rights of indemnification to which such persons may be entitled pursuant to the Company's Certificate of Incorporation or Bylaws, as a matter of law, or otherwise, or any power that the Company may have to indemnify them or hold them harmless.

Article 4 Shares Subject to the Plan

4.1 Number of Shares. Subject to adjustment as provided in Sections 4.2 and 4.3, the aggregate number of Shares of Stock which may be issued or transferred pursuant to Awards under the Plan shall be the sum of 6,123,000 shares plus the number of shares available for grant under the Prior Plan as of the Effective Date. Notwithstanding the foregoing, in order that the applicable regulations under the Code relating to Incentive Stock Options be satisfied, the maximum number of shares of Stock that may be delivered upon exercise of Incentive Stock Options shall be 2,000,000, as adjusted under Sections 4.2 and 4.3. Shares of Stock issued pursuant to the Plan may be either authorized but unissued Shares or Shares held by the Company in its treasury. Upon effectiveness of the Plan, no further awards shall be granted under a Prior Plan.

4.2 Share Accounting. Without limiting the discretion of the Committee under this section, the following rules will apply for purposes of the determination of the number of Shares available for grant under the Plan or compliance with the foregoing limits:

(a) If an outstanding Award for any reason expires or is terminated or canceled without having been exercised or settled in full, or if Shares acquired pursuant to an Award subject to forfeiture are forfeited under the terms of the Plan or the relevant Award, the Shares allocable to the terminated portion of such Award or such forfeited Shares shall again be available for issuance under the Plan. This subsection 4.2(a) shall also apply to awards granted under the Prior Plan, which are outstanding as of the Effective Date.

(b) Shares shall not be deemed to have been issued pursuant to the Plan (or the Prior Plan) with respect to any portion of an Award that is settled in cash, other than an Option.

(c) In the event that withholding tax liabilities arising from a full-value Award (i.e., an award other than an Option or SAR) or, after the Effective Date, arising from a full-value award under the Prior Plan, are satisfied by the delivery or withholding of shares, the shares so tendered or withheld shall be added to the 2021 Incentive Plan's reserve. Notwithstanding anything to the contrary contained herein, shares subject to an Award shall not again be made available for issuance or delivery under the Plan if such shares are (i) shares tendered in payment of an Option; (ii) shares delivered or withheld by the Company to satisfy any tax withholding obligation with respect to an Option or SAR; (iii) shares covered by a stock-settled Stock Appreciation Right that were not issued upon the settlement of the SAR; or (iv) shares purchased on the open market with Option proceeds.

4.3 Adjustments in Authorized Plan Shares and Outstanding Awards. In the event of any merger, reorganization, consolidation, recapitalization, separation, split-up, spin-off, liquidation, Share combination, Stock split, Stock dividend, an extraordinary cash distribution on Stock, a corporate separation or other reorganization or liquidation or other change in the corporate or capital structure of the Company affecting the Shares, an adjustment shall be made in a manner consistent with Sections 422 and 424(h)(3) of the Code for Incentive Stock Options and in a manner consistent with Section 409A of the Code for Non-Qualified Stock Options and Stock Appreciation Rights and in the number and class of and/or price of Shares subject to outstanding Awards granted under the Plan, and/or the number of outstanding Options, Stock Appreciation Rights, Shares of Restricted Stock, and Performance Shares (and Restricted Stock Units, Performance Stock Units and other Awards whose value is based on a number of Shares) constituting outstanding Awards, as may be determined to be appropriate and equitable by the Committee, in its sole discretion, to prevent dilution or enlargement of rights. The Committee shall also adjust any available share reserve accordingly. The Committee may make adjustments in the terms and conditions of, and the criteria included in Awards in recognition of unusual or nonrecurring events (including, without limitation, the events described in this Section) affecting the Company or the financial statements of the Company or of changes in applicable laws, regulations, or accounting principles, whenever the Committee determines that such adjustments are appropriate in order to prevent dilution or enlargement of the benefits or potential benefits intended to be made available under the Plan. Adjustments under this Section 4.3 shall be consistent with Section 409A of the Code and adjustments pursuant to determination of the Committee shall be conclusive and binding on all Participants under the Plan.

4.4 Limitation on Number of Shares Granted to Non-Employee Directors. The maximum number of Shares subject to Awards granted during a single fiscal year to any Non-Employee Director, taken together with any cash fees paid during the fiscal year to the Non-Employee Director, in respect of such Director's service as a member of the Board during such year (including service as a member or chair of any committees of the Board), shall not exceed \$500,000 in total value (calculating the value of any such Awards based on the grant date Fair Market Value of such Awards for financial reporting purposes). The independent members of the Board may make exceptions to this limit for a non-executive chair of the Board, provided that the Non-Employee Director receiving such additional compensation may not participate in the decision to award such compensation.

Article 5 Eligibility and Participation

5.1 Eligibility and Participation. Subject to the provisions of the Plan, the Committee may, from time to time, select from all Eligible Persons, those to whom Awards shall be granted and shall determine, in its sole discretion, the nature of, any and all terms permissible by law, and the amount of each Award. In making this determination, the Committee may consider any factors it deems relevant, including without limitation, the office or position held by a Participant or the Participant's relationship to the Company, the Participant's degree of responsibility for and contribution to the growth and success of the Company or any Subsidiary or Affiliate, the Participant's length of service, promotions and potential. No individual shall have the right to be selected to receive an Award under this Plan, or, having been so selected, to be selected to receive a future Award. In addition, there is no obligation for uniformity of treatment of Participants or holders or beneficiaries of Awards. The terms and conditions of Awards and the Committee's determinations and interpretations with respect thereto need not be the same with respect to each Participant and may be made selectively among Participants, whether or not such Participants are similarly situated.

5.2 Foreign Participants. In order to assure the viability of Awards granted to Participants employed in foreign countries, the Committee may provide for such special terms as it may consider necessary or appropriate to accommodate differences in local law, tax policy, or custom. Moreover, the Committee may approve such supplements to, or amendments, restatements, or alternative versions of, the Plan as it may consider necessary or appropriate for such purposes without thereby affecting the terms of the Plan as in effect for any other purpose; provided, however, that no such supplements, amendments, restatements, or alternative versions shall increase the share limitations contained in Section 4.1 of the Plan.

Article 6 Options

6.1 Grant of Options. Subject to the terms and provisions of the Plan, Options may be granted to Participants in such number, and upon such terms and conditions, and at any time and from time to time as shall be determined by the Committee, in its sole discretion, subject to the limitations set forth in Article 4 and the following terms and conditions:

(a) Award Agreement. Each Option grant shall be evidenced by an Award Agreement that shall specify the terms and conditions of the Option, including the Exercise Price, the maximum duration of the Option, the number of Shares to which the Option pertains, the conditions upon which an Option shall become vested and exercisable, and such other provisions as the Committee shall determine which are not inconsistent with the terms of the Plan. The Award Agreement also shall specify whether the Option is intended to be an Incentive Stock Option or a Non-Qualified Stock Option.

(b) Exercise Period. Unless a shorter period is otherwise provided by the Committee at the time of grant, each Option will expire on the tenth (10th) anniversary date of its grant or on the fifth (5th) anniversary of its grant date if the Participant is a Ten Percent Owner. Notwithstanding the foregoing, in the event that on the last business day of the term of an Option (x) the exercise of which is prohibited by applicable law or (y) Shares may not be purchased or sold by certain Employees or Directors of the Company due to a “black-out period” of a Company policy or a “lock-up” agreement undertaken in connection with an issuance of securities by the Company, the Committee may provide that the term of the Option shall be extended but not beyond a period of thirty (30) days following the end of the legal prohibition, black-out period or lock-up agreement and provided further that no extension will be made if the grant price of such Option at the date the initial term would otherwise expire is above the Fair Market Value.

(c) Exercise Price. Unless a greater Exercise Price is determined by the Committee, the Exercise Price for each Option awarded under this Plan shall be equal to one hundred percent (100%) of the Fair Market Value of a Share on the date the Option is granted. Notwithstanding the foregoing, the Committee may determine the Exercise Price for a substitute Award, provided such Exercise Price does not violate applicable law (including, but not limited to, Section 409A of the Code).

(d) Vesting of Options. A grant of Options shall vest at such times and under such terms and conditions as determined by the Committee including, without limitation, suspension of a Participant’s vesting during all or a portion of a Participant’s leave of absence.

6.2 Limitations on Incentive Stock Options. In addition to the general requirements of Article 6, the terms of any Incentive Stock Option (“ISO”) granted pursuant to the Plan must comply with the provisions of this Section 6.2.

(a) ISO Eligibility. ISOs may be granted only to Employees of the Company or of any parent or subsidiary corporation (as permitted under Sections 422 and 424 of the Code). No ISO Award may be made pursuant to this Plan after the tenth (10th) anniversary of the Effective Date.

(b) ISO Individual Dollar Limitation. The aggregate Fair Market Value (determined as of the date the Option is granted) of all Shares with respect to which Incentive Stock Options are first exercisable by a Participant in any calendar year may not exceed one hundred thousand dollars (\$100,000.00) or such other limitation as imposed by Section 422(d) of the Code. To the extent that Incentive Stock Options are first exercisable by a Participant in excess of such limitation, the excess shall be considered Non-Qualified Stock Options.

(c) ISO Expiration. An ISO will expire and may not be exercised to any extent by anyone after the first to occur of the following events:

(i) Ten (10) years from the date of grant, unless an earlier time is set in the Award Agreement;

(ii) Three (3) months after the date of the Participant’s Termination of Employment other than on account of Disability or death. Whether a Participant continues to be an employee shall be determined in accordance with Treas. Reg. Section 1.421-1(h)(2); and

(iii) One (1) year after the date of the Participant’s Termination of Employment on account of Disability or death. Upon the Participant’s Disability or death, any ISOs exercisable at the Participant’s Disability or death may be exercised by the Participant’s legal representative or representatives, by the person or persons entitled to do so pursuant to the Participant’s last will and testament, or, if the Participant fails to make testamentary disposition of such ISO or dies intestate, by the person or persons entitled to receive the ISO pursuant to the applicable laws of descent and distribution.

Any ISO that remains exercisable pursuant to a Participant's agreement with the Company following Termination of Employment and is unexercised more than one (1) year following Termination of Employment by reason of death or Disability or more than three (3) months following Termination of Employment for any reason other than death or Disability will thereafter be deemed to be a Non-Qualified Stock Option.

(d) Ten Percent Owners. In the case of an ISO granted to a Ten Percent Owner, such ISO shall be granted at an exercise price that is not less than one hundred and ten percent (110%) of Fair Market Value on the date of grant and, unless a shorter period is otherwise provided by the Committee at the time of grant, each ISO will expire on the fifth (5th) anniversary of its grant date.

(e) Notification of Disposition. If a Participant disposes of Shares acquired upon exercise of an ISO within two (2) years from the date the Option is granted or within one (1) year after the issuance of such Shares to the Participant, the Participant shall notify the Company of such disposition and provide information regarding the date of disposition, sale price, number of Shares disposed of, and any other information relating thereto that the Company may reasonably request.

(f) Right to Exercise. During a Participant's lifetime, an Incentive Stock Option may be exercised only by the Participant.

(g) Failure to Meet ISO Requirements. If an Option is intended to be an Incentive Stock Option, and if, for any reason, such Option (or any portion thereof) shall not qualify as an Incentive Stock Option, then, to the extent of such nonqualification, such Option (or portion thereof) shall be regarded as a Non-Qualified Stock Option appropriately granted under the Plan; *provided that* such Option (or portion thereof) otherwise complies with the Plan's requirements relating to Non-Qualified Stock Options.

6.3 Exercise of Options.

(a) Options granted under the Plan shall be exercisable at such times and be subject to such restrictions and conditions as the Committee shall in each instance approve, which need not be the same for each grant or for each Participant. Exercises of Options may be effected only on days and during the hours NASDAQ is open for regular trading. The Company may change or limit the times or days Options may be exercised. If an Option expires on a day or at a time when exercises are not permitted, then the Options may be exercised no later than the immediately preceding date and time that the Options were exercisable.

(b) An Option shall be exercised by providing notice to the designated agent selected by the Company (if no such agent has been designated, then to the Company), in the manner and form determined by the Company, which notice shall be irrevocable, setting forth the exact number of Shares with respect to which the Option is being exercised and including with such notice payment of the Exercise Price, as applicable. When an Option has been transferred, the Company or its designated agent may require appropriate documentation that the person or persons exercising the Option, if other than the Participant, has the right to exercise the Option. No Option may be exercised with respect to a fraction of a Share.

6.4 Termination of Employment. Unless otherwise provided by the Committee in the applicable Award Agreement, the following limitations on the exercise of Options shall apply upon Termination of Employment:

(a) Termination by Death or Disability. In the event of the Participant's Termination of Employment by reason of death or Disability, all outstanding Options granted to such Participant which are vested and exercisable as of the effective date of Termination of Employment by reason of death or Disability may be exercised, if at all, no more than one (1) year from such date of Termination of Employment, unless the Options, by their terms, expire earlier. All unvested Options granted to such Participant shall immediately become forfeited.

(b) Involuntary Termination Without Cause. If a Participant's Termination of Employment is by involuntary termination without Cause, all Options held by such Participant that are vested and exercisable at the time of the Participant's Termination of Employment may be exercised by the Participant at any time within a period of ninety (90) days from the date of such Termination of Employment, but in no event beyond the expiration of the stated term of such Options. All Options held by the Participant which are not vested on or before the effective date of Termination of Employment shall immediately be forfeited to the Company (and the Shares subject to such forfeited Options shall once again become available for issuance under the Plan).

(c) Voluntary Termination. If a Participant's Termination of Employment is voluntary (other than a voluntary termination described in Section 6.4(d)), all Options held by such Participant that are vested and exercisable at the time of the Participant's Termination of Employment may be exercised by the Participant at any time within a period of ninety (90) days from the date of such Termination of Employment, but in no event beyond the expiration of the stated terms of such Options. All Options held by the Participant which are not vested on or before the effective date of Termination of Employment shall immediately be forfeited to the Company (and the Shares subject to such forfeited Options shall once again become available for issuance under the Plan).

(d) Termination for Cause. If the Participant's Termination of Employment (i) is by the Company for Cause or (ii) is a voluntary Termination (as provided in Subsection (c) above) after the occurrence of an event that would be grounds for Termination of Employment for Cause, all outstanding Options held by the Participant shall immediately be forfeited to the Company and no additional exercise period shall be allowed, regardless of the vested status of the Options (and the Shares subject to such forfeited Options shall once again become available for issuance under the Plan).

(e) Other Terms and Conditions. A Participant holding an Option is not eligible to receive dividends or Dividend Equivalents. Notwithstanding the foregoing, the Committee may, in its sole discretion, establish different, or waive, terms and conditions pertaining to the effect of Termination of Employment on Options, whether or not the Options are outstanding, but no such modification shall be materially adverse to the Participant.

6.5 Payment. The Committee shall determine the methods by which payments by any Participant with respect to any Awards granted under the Plan may be paid and the form of payment. Unless otherwise determined by the Committee, the Exercise Price shall be paid in full at the time of exercise. No Shares shall be issued or transferred until full payment has been received or the next business day thereafter, as determined by the Company. The Committee may, from time to time, determine or modify the method or methods of exercising Options or the manner in which the Exercise Price is to be paid. Unless otherwise provided by the Committee in full or in part, to the extent permitted by Applicable Law, payment may be made by any of the following:

(a) cash or certified or bank check;

(b) delivery of Shares owned by the Participant duly endorsed for transfer to the Company, with a Fair Market Value of such Shares delivered on the date of delivery equal to the Exercise Price (or portion thereof) due for the number of Shares being acquired;

(c) if the Company has designated a stockbroker to act as the Company's agent to process Option exercises, an Option may be exercised by issuing an exercise notice together with instructions to such stockbroker irrevocably instructing the stockbroker: (i) to immediately sell (which shall include an exercise notice that becomes effective upon execution of a sale order) a sufficient portion of the Shares to be received from the Option exercise to pay the Exercise Price of the Options being exercised and the required tax withholding, and (ii) to deliver on the settlement date the portion of the proceeds of the sale equal to the Exercise Price and tax withholding to the Company. In the event the stockbroker sells any Shares on behalf of a Participant, the stockbroker shall be acting solely as the agent of the Participant, and the Company disclaims any responsibility for the actions of the stockbroker in making any such sales. However, if the Participant is an Insider, then the instruction to the stock broker to sell in the preceding sentence is intended to comply with the requirements of Rule 10b5-1(c)(1)(i)(B) of the Exchange Act to the extent permitted by law. No Shares shall be issued until the settlement date and until the proceeds (equal to the Exercise Price and tax withholding) are paid to the Company;

(d) at any time, the Committee may, in addition to or in lieu of the foregoing, provide that an Option may be "stock settled," which shall mean upon exercise of an Option, the Company may fully satisfy its obligation under the Option by delivering that number of shares of Stock found by taking the difference between (i) the Fair Market Value of the Stock on the exercise date, multiplied by the number of Options being exercised and (ii) the total Exercise Price of the Options being exercised, and dividing such difference by the Fair Market Value of the Stock on the exercise date; or

- (e) any combination of the foregoing methods.

Notwithstanding any other provision of the Plan to the contrary, no Participant who is a Director or an “executive officer” of the Company shall be permitted to pay the Exercise Price of an Option in any method which would violate Section 13(h) of the Exchange Act.

Article 7

Stock Appreciation Rights

7.1 Grant of SARs. Any Participant selected by the Committee may be granted one or more SARs. SARs may be granted alone or in tandem with Options. Each SAR shall be evidenced by an Award Agreement that shall specify the exercise price, the term of the SAR, and such other provisions as the Committee shall determine. With respect to SARs granted in tandem with Options, the exercise of either such Options or such SARs shall result in the simultaneous cancellation of the same number of tandem SARs or Options, as the case may be.

7.2 Exercise Price. The exercise price per Share covered by a SAR granted pursuant to the Plan shall be equal to or greater than Fair Market Value on the date the SAR was granted.

7.3 Term. The term of each SAR shall be determined by the Committee in its sole discretion, but in no event shall the term exceed ten (10) years from the date of grant. Notwithstanding the foregoing, in the event that on the last business day of the term of a SAR (x) the exercise of which is prohibited by applicable law or (y) Shares may not be purchased or sold by certain Employees or Directors of the Company due to a “black-out period” of a Company policy or a “lock-up” agreement undertaken in connection with an issuance of securities by the Company, the Committee may provide that the term of the SAR shall be extended but not beyond a period of thirty (30) days following the end of the legal prohibition, black-out period or lock-up agreement and provided further that no extension will be made if the grant price of such SAR at the date the initial term would otherwise expire is above the Fair Market Value.

7.4 Payment. SARs may be settled in the form of cash, shares of Stock or a combination of cash and shares of Stock, as determined by the Committee.

7.5 Other Provisions. Except as the Committee may deem inappropriate or inapplicable in the circumstances, SARs shall be subject to terms and conditions substantially similar to those applicable to Non-Qualified Options as set forth in Article 6, including, but not limited to, the ineligibility to receive dividends or Dividend Equivalents.

Article 8

Restricted Stock Awards

8.1 Grant of Restricted Stock. Subject to the terms and provisions of the Plan, the Committee, at any time and from time to time, may grant shares of Restricted Stock to Eligible Persons in such amounts and upon such terms and conditions as the Committee shall determine. In addition to any other terms and conditions imposed by the Committee, vesting of Restricted Stock may be conditioned upon the achievement of Performance Goals.

8.2 Restricted Stock Agreement. The Committee may require, as a condition to receiving a Restricted Stock Award, that the Participant enter into a Restricted Stock Award Agreement, setting forth the terms and conditions of the Award. In lieu of a Restricted Stock Award Agreement, the Committee may provide the terms and conditions of an Award in a notice to the Participant of the Award, on the Stock certificate representing the Restricted Stock, in the resolution approving the Award, or in such other manner as it deems appropriate. If certificates representing the Restricted Stock are registered in the name of the Participant, any certificates so issued shall be printed with an appropriate legend referring to the terms, conditions, and restrictions applicable to such Award as determined or authorized in the sole discretion of the Committee. Shares recorded in book-entry form shall be recorded with a notation referring to the terms, conditions, and restrictions applicable to such Award as determined or authorized in the sole discretion of the Committee. The Committee may require that the stock certificates or book-entry registrations evidencing shares of Restricted Stock be held in custody by a designated escrow agent (which may but need not be the Company) until the restrictions thereon shall have lapsed, and that the Participant deliver a stock power, endorsed in blank, relating to the Stock covered by such Award.

8.3 Restrictions. The Restricted Stock shall be subject to such vesting terms, including the achievement of Performance Goals, as may be determined by the Committee. Unless otherwise provided by the Committee, to the extent Restricted Stock is subject to any condition to vesting, if such condition or conditions are not satisfied by the time the period for achieving such condition has expired, such Restricted Stock shall be forfeited. The Committee may impose such other conditions and/or restrictions on any shares of Restricted Stock granted pursuant to the Plan as it may deem advisable including but not limited to a requirement that Participants pay a stipulated purchase price for each share of Restricted Stock and/or restrictions under Applicable Law. The Committee may also grant Restricted Stock without any terms or conditions in the form of vested Stock Awards.

8.4 Removal of Restrictions. Except as otherwise provided in this Article 8 or otherwise provided in the grant thereof, Shares of Restricted Stock covered by each Restricted Stock grant made under the Plan shall become freely transferable by the Participant after completion of all conditions to vesting, if any. However, the Committee, in its sole discretion, shall have the right to waive all or part of the restrictions and conditions with regard to all or part of the shares held by any Participant at any time.

8.5 Voting Rights, Dividends and Other Distributions. Participants holding shares of Restricted Stock granted hereunder may exercise full voting rights and, subject to the provisions of this Section 8.5, may receive all dividends and distributions paid with respect to such Shares. If any such dividends or distributions are paid in Shares, the Shares shall automatically be subject to the same restrictions and conditions as the Restricted Stock with respect to which they were paid. In addition, with respect to a share of Restricted Stock, dividends shall only be paid out to the extent that the Share of Restricted Stock vests. Any cash dividends and stock dividends with respect to the Restricted Stock shall be withheld by the Company for the Participant's account, and interest may be credited on the amount of the cash dividends withheld at a rate and subject to such terms as determined by the Committee. The cash dividends or stock dividends so withheld by the Committee and attributable to any particular share of Restricted Stock (and earnings thereon, if applicable) shall be distributed to the Participant in cash or, at the discretion of the Committee, in shares of Stock having a Fair Market Value equal to the amount of such dividends, if applicable, upon the release of restrictions on such share and, if such share is forfeited, the Participant shall have no right to such dividends.

8.6 Termination of Employment Due to Death or Disability. In the event of the Participant's Termination of Employment by reason of death or Disability, unless otherwise determined by the Committee, all restrictions imposed on outstanding Shares of Restricted Stock held by the Participant shall immediately lapse and the Restricted Stock shall immediately become fully vested as of the date of Termination of Employment.

8.7 Termination of Employment for Other Reasons. Unless otherwise provided by the Committee, in the event of the Participant's Termination of Employment for any reason other than those specifically set forth in Section 8.6 herein, subject to Section 10.2, all shares of Restricted Stock held by the Participant which are not vested as of the effective date of Termination of Employment shall immediately be forfeited and returned to the Company.

8.8 Section 83(b) Election. The Committee may provide in an Award Agreement that the Award of Restricted Stock is conditioned upon the Participant making or refraining from making an election with respect to the Award under Section 83(b) of the Code. If a Participant makes an election pursuant to Section 83(b) of the Code concerning a Restricted Stock Award, the Participant shall be required to file a copy of such election with the Company within thirty (30) days following the date of grant.

8.9 Restricted Stock Units. In lieu of or in addition to Restricted Stock, the Committee may grant Restricted Stock Units under such terms and conditions as shall be determined by the Committee in accordance with Section 3.2. Restricted Stock Units shall be subject to the same terms and conditions under this Plan as Restricted Stock except as otherwise provided in this Plan or as otherwise provided by the Committee. Except as otherwise provided by the Committee, the award shall be settled and paid out promptly upon vesting (to the extent permitted by Section 409A of the Code), and the Participant holding such Restricted Stock Units shall receive, as determined by the Committee, Shares (or cash equal to the Fair Market Value of the number of Shares as of the date the Award becomes payable) equal to the number of such Restricted Stock Units. Restricted Stock Units shall not be transferable, shall have no voting rights, and, unless otherwise determined by the Committee, shall not receive dividends or Dividend Equivalents (which in any event shall only be paid out to the extent that the Restricted Stock Units vest). Upon a Participant's Termination of Employment due to death or Disability, the Committee will determine whether there should be any acceleration of vesting.

Article 9
Other Types of Awards

9.1 Performance Share Awards. Any Participant selected by the Committee may be granted one or more Performance Share awards which shall be denominated in a number of shares of Stock and which may be linked to any one or more of the Performance Goals or other specific performance criteria determined appropriate by the Committee, in each case on a specified date or dates or over any period or periods determined by the Committee. In making such determinations, the Committee shall consider (among such other factors as it deems relevant in light of the specific type of award) the contributions, responsibilities and other compensation of the particular Participant.

9.2 Performance Stock Units. Any Participant selected by the Committee may be granted one or more Performance Stock Unit awards which shall be denominated in units of value including dollar value of shares of Stock and which may be linked to any one or more of the Performance Goals or other specific performance criteria determined appropriate by the Committee, in each case on a specified date or dates or over any period or periods determined by the Committee. In making such determinations, the Committee shall consider (among such other factors as it deems relevant in light of the specific type of award) the contributions, responsibilities and other compensation of the particular Participant.

9.3 Dividend Equivalents. Any Participant selected by the Committee may be granted Dividend Equivalents based on the dividends declared on the Shares that are subject to any Award, to be credited as of dividend payment dates, during the period between the date the Award is granted and the date the Award is exercised, vests or expires, as determined by the Committee. Such Dividend Equivalents shall be converted to cash or additional shares of Stock by such formula and at such time and subject to such limitations as may be determined by the Committee, in a matter consistent with the rules of Section 409A of the Code; provided that, to the extent Shares subject to an Award are subject to vesting conditions, any Dividend Equivalents relating to such Shares shall be subject to the same vesting conditions.

9.4 Deferred Stock. Any Participant selected by the Committee may be granted an award of Deferred Stock in the manner determined from time to time by the Committee. The number of shares of Deferred Stock shall be determined by the Committee and may be linked to the Performance Goals or other specific performance criteria determined to be appropriate by the Committee, in each case on a specified date or dates or over any period or periods determined by the Committee. Stock underlying a Deferred Stock Award will not be issued until the Deferred Stock Award has vested, pursuant to a vesting schedule or performance criteria set by the Committee. Unless otherwise provided by the Committee, a Participant awarded Deferred Stock shall have no rights as a Company stockholder with respect to such Deferred Stock until such time as the Deferred Stock Award has vested and the Stock underlying the Deferred Stock Award has been issued.

9.5 Other Stock-Based Awards. Any Participant selected by the Committee may be granted one or more Awards that provide Participants with shares of Stock or the right to purchase shares of Stock or that have a value derived from the value of, or an exercise or conversion privilege at a price related to, or that are otherwise payable in shares of Stock and which may be linked to any one or more of the Performance Goals or other specific performance criteria determined appropriate by the Committee, in each case on a specified date or dates or over any period or periods determined by the Committee. In making such determinations, the Committee shall consider (among such other factors as it deems relevant in light of the specific type of Award) the contributions, responsibilities and other compensation of the particular Participant.

9.6 Performance Bonus Awards. Any Participant selected by the Committee may be granted one or more Awards in the form of a cash bonus (a “Performance Bonus Award”) payable upon the attainment of Performance Goals that are established by the Committee, in each case on a specified date or dates or over any period or periods determined by the Committee.

9.7 Term. Except as otherwise provided herein, the term of any Award of Performance Shares, Performance Stock Units, Dividend Equivalents, Deferred Stock, Other Stock-Based Award and Performance Bonus Award shall be set by the Committee in its discretion.

9.8 Exercise or Purchase Price. The Committee may establish the exercise or purchase price, if any, of any Award of Performance Shares, Performance Stock Units, Deferred Stock, Other Stock-Based Award and Performance Bonus Award; provided, however, that such price shall not be less than the Fair Market Value of a share of Stock on the date of grant, unless otherwise permitted by Applicable Law.

9.9 Exercise Upon Termination of Employment or Service. An Award of Performance Shares, Performance Stock Units, Deferred Stock, Other Stock-Based Awards and Performance Bonus Awards shall only be exercisable or payable while the Participant is an Employee, Consultant or Non-Employee Director, as applicable; provided, however, that the Committee in its sole and absolute discretion may provide that an Award of Performance Shares, Performance Stock Units, Deferred Stock, Stock Appreciation Rights, Other Stock-Based Award and Performance Bonus Award may be exercised or paid subsequent to a Termination of Employment without Cause. In the event of the Termination of Employment of a Participant by the Company for Cause, all Awards under this Article 9 shall be forfeited by the Participant to the Company.

9.10 Form of Payment. Payments with respect to any Awards granted under this Article 9 shall be made in cash, in Stock or a combination of both, as determined by the Committee.

9.11 Award Agreement. All Awards under this Article 9 shall be subject to such additional terms and conditions as determined by the Committee and shall be evidenced by a written Award Agreement.

Article 10 Change in Control

10.1 Vesting Upon Change in Control. For the avoidance of doubt, the Committee may not accelerate the vesting and exercisability (as applicable) of any outstanding Awards, in whole or in part, solely upon the occurrence of a Change in Control except as provided in this Section 10.1. In the event of a Change in Control after the date of the adoption of the Plan, then:

(a) to the extent an outstanding Award subject solely to time-based vesting is not assumed or replaced by a comparable Award referencing shares of the capital stock of the successor corporation or its “parent corporation” (as defined in Section 424(e) of the Code) or “subsidiary corporation” (as defined in Section 424(f) of the Code) which is publicly traded on a national stock exchange or quotation system, as determined by the Committee in its sole discretion, with appropriate adjustments as to the number and kinds of shares and the exercise prices, if applicable, then any outstanding Award subject solely to time-based vesting then held by Participants that is unexercisable, unvested or still subject to restrictions or forfeiture shall, in each case as specified by the Committee in the applicable Award Agreement or otherwise, be deemed exercisable or otherwise vested, as the case may be, as of immediately prior to such Change in Control;

(b) any stock-denominated performance-based Awards outstanding as of the date such Change in Control is determined to have occurred shall be converted into, as applicable, time-based restricted stock of the successor corporation or its “parent corporation” (as defined in Section 424(e) of the Code) or “subsidiary corporation” (as defined in Section 424(f) of the Code) or time-based restricted stock units based on the capital stock of the successor corporation or its “parent corporation” (as defined in Section 424(e) of the Code) or “subsidiary corporation” (as defined in Section 424(f) of the Code) and, if, during the 12-month period following the date of such Change in Control, the Participant’s employment is terminated by such successor (or an affiliate thereof) without Cause or by the Participant for Good Reason, such Awards, to the extent then outstanding, shall fully vest. With respect to performance-based Awards that are outstanding as of the date of such Change in Control and are not converted to a time-based Award, any deferral or other restriction shall lapse and such Awards shall be settled in cash as promptly as is practicable (unless otherwise required by Section 409A of the Code and the applicable terms of the Awards). In either case, unless otherwise determined by the Committee in an Award Agreement or otherwise, the value of the performance-based Awards as of the date of the Change in Control shall be determined assuming target performance has been achieved, except that the value shall be determined based on actual performance as of such date if (i) more than half of the performance period has elapsed as of such date and (ii) actual performance is determinable as of such date; and

(c) Each outstanding Award that is assumed in connection with a Change in Control, or is otherwise to continue in effect subsequent to the Change in Control, will be appropriately adjusted, immediately after the Change in Control, as to the number and class of securities and other relevant terms in accordance with Section 4.3.

10.2 Termination of Employment Upon Change in Control. Notwithstanding any other provision of the Plan to the contrary, and except as may otherwise be provided in any applicable Award Agreement or other written agreement entered into between the Company or Affiliate and a Participant, upon (i) a Participant's involuntary Termination of Employment without Cause on or within one (1) year following a Change in Control, or (ii) a Participant's Termination of Employment for Good Reason (including the Termination of Employment of the Participant if he or she is employed by an Affiliate at the time the Company sells or otherwise divests itself of such Affiliate), all outstanding Awards shall immediately become fully vested and exercisable; *provided that* Restricted Stock Units shall be settled in accordance with the terms of the grant without regard to the Change in Control unless the Change in Control constitutes a "change in control event" within the meaning of Section 409A of the Code and such Termination of Employment occurs within one (1) year following such Change in Control, in which case the Restricted Stock Units shall be settled and paid out with such Termination of Employment.

10.3 Cancellation and Termination of Awards. The Committee may, in connection with any merger, consolidation, share exchange or other transaction entered into by the Company in good faith, determine that any outstanding Awards granted under the Plan, whether or not vested, will be canceled and terminated and that in connection with such cancellation and termination the holder of such Award may receive for each Share subject to such Award a cash payment (or the delivery of shares of stock, other securities or a combination of cash, stock and securities equivalent to such cash payment) equal to the difference, if any, between the amount determined by the Committee to be the Fair Market Value of the Stock and the purchase price per Share (if any) under the Award multiplied by the number of Shares subject to such Award; provided that if such product is zero or less or to the extent that the Award is not then exercisable, the Award will be canceled and terminated without payment therefor.

Article 11

Amendment, Modification, and Termination

11.1 Amendment, Modification, and Termination of Plan. At any time and from time to time, the Board may amend, modify, alter, suspend, discontinue or terminate the Plan, in whole or in part, without stockholder approval; provided, however, that (a) to the extent necessary and desirable to comply with any Applicable Law, regulation, or stock exchange rule, the Company shall obtain stockholder approval of any Plan amendment in such a manner and to such a degree as required, and (b) stockholder approval is required for any amendment to the Plan that (i) increases the number of shares available under the Plan (other than any adjustment as provided by Section 4.3) or the number of shares available for issuance as ISOs, or (ii) permits the Committee to grant Options with an Exercise Price that is below Fair Market Value on the date of grant (except as otherwise provided in Section 6.1), or (iii) permits the Committee to extend the exercise period for an Option beyond ten (10) years from the date of grant (except as otherwise provided in Section 6.1), or (iv) results in a material increase in benefits or a change in eligibility requirements, or (v) changes the granting corporation or (vi) changes the type of stock.

11.2 Amendment of Awards. Subject to Section 4.3, at any time and from time to time, the Committee may amend the terms of any one or more outstanding Awards, provided that the Award as amended is consistent with the terms of the Plan or if necessary or advisable for the purpose of conforming the Plan or an Award Agreement to any present or future law relating to plans of this or similar nature (including, without limitation, Section 409A), and to the administrative regulations and rulings promulgated thereunder.

11.3 Awards Previously Granted. No termination, amendment, or modification of the Plan or any Award shall adversely affect in any material way any Award previously granted under the Plan, without the written consent of the Participant holding such Award; provided, however, that any such modification made for the purpose of complying with Section 409A of the Code may be made by the Company without the consent of any Participant.

11.4 Repricing and Backdating Prohibited. Notwithstanding anything in this Plan to the contrary, except as provided under Section 4.3 and Section 11.2, neither the Committee nor any other person may (i) amend the terms of outstanding Options or SARs to reduce the exercise or grant price of such outstanding Options or SARs; (ii) cancel outstanding Options or SARs in exchange for Options or SARs with an exercise or grant price that is less than the exercise price of the original Options or SARs; or (iii) cancel outstanding Options or SARs with an exercise or grant price above the current Share price in exchange for cash or other securities. In addition, the Committee may not make a grant of an Option or SAR with a grant date that is effective prior to the date the Committee takes action to approve such Award.

Article 12 Withholding

12.1 Tax Withholding. Unless otherwise provided by the Committee, the Company shall deduct or withhold any amount needed to satisfy any foreign, federal, state, or local tax (including but not limited to the Participant's employment tax obligations) required by law to be withheld with respect to any taxable event arising or as a result of this Plan ("Withholding Taxes").

12.2 Share Withholding. Unless otherwise provided by the Committee, upon the exercise of Options, the lapse of restrictions on Restricted Stock, the vesting of Restricted Stock Units the distribution of Performance Shares in the form of Stock, or any other taxable event hereunder involving the transfer of Stock to a Participant, the Company shall withhold Stock equal in value, using the Fair Market Value on the date determined by the Company to be used to value the Stock for tax purposes, to the Withholding Taxes applicable to such transaction.

Unless otherwise determined by the Committee, when the method of payment for the Exercise Price is from the sale by a stockbroker pursuant to Section 6.5(c), herein, of the Stock acquired through the Option exercise, then the tax withholding shall be satisfied out of the proceeds. For administrative purposes in determining the amount of taxes due, the sale price of such Stock shall be deemed to be the Fair Market Value of the Stock.

If permitted by the Committee, prior to the end of any Performance Period a Participant may elect to have a greater amount of Stock withheld from the distribution of Performance Shares to pay withholding taxes; provided, however, the Committee may prohibit or limit any individual election or all such elections at any time.

Alternatively, or in combination with the foregoing, the Committee may require Withholding Taxes to be paid in cash by the Participant or by the sale of a portion of the Stock being distributed in connection with an Award, or by a combination thereof.

The withholding of taxes is intended to comply with the requirements of Rule 10b5-1(c)(1)(i)(B) of the Exchange Act to the extent permitted by law.

Article 13 General Provisions Applicable to Awards

13.1 Minimum Vesting Requirement. Notwithstanding any other provision of the Plan to the contrary, Awards granted under the Plan (other than cash-based awards) shall vest no earlier than the first anniversary of the date on which the Award is granted; provided, that the following Awards shall not be subject to the foregoing minimum vesting requirement: any (i) substitute Awards granted in connection with awards that are assumed, converted or substituted pursuant to a merger, acquisition or similar transaction entered into by the Company or any of its Subsidiaries, (ii) Shares delivered in lieu of fully vested cash obligations, (iii) Awards to Non-Employee Directors that vest on the earlier of the one-year anniversary of the date of grant and the next annual meeting of stockholders which is at least 50 weeks after the immediately preceding year's annual meeting, and (iv) any additional Awards the Committee may grant, up to a maximum of five percent (5%) of the available share reserve authorized for issuance under the Plan pursuant to Section 4.1 (subject to adjustment under Section 4.3); and, provided, further, that the foregoing restriction does not apply to the Committee's discretion to provide for accelerated exercisability or vesting of any Award, including in cases of retirement, death, Disability or a Change in Control, in the terms of the Award Agreement or otherwise.

13.2 Form of Payment. Subject to the provisions of this Plan, the Award Agreement and any Applicable Law, payments or transfers to be made by the Company or any Affiliate on the grant, exercise, or settlement of any Award may be made in such form as determined by the Committee including, without limitation, cash, Stock, other Awards, other property, or any combination thereof, and may be made in a single payment or transfer, in installments, or any combination thereof, in each case determined by rules adopted by the Committee.

13.3 Treatment of Dividends and Dividend Equivalents on Unvested Awards. Notwithstanding any other provision of the Plan to the contrary, with respect to any Award that provides for or includes a right to dividends or Dividend Equivalents, if dividends are declared during the period that an equity Award is outstanding, such dividends (or Dividend Equivalents) shall either (a) not be paid or credited with respect to such Award or (b) be accumulated but remain subject to vesting requirement(s) to the same extent as the applicable Award and shall only be paid at the time or times such vesting requirement(s) are satisfied.

13.4 Limits on Transfer.

(a) Except as otherwise provided in Section 13.4(b),

(i) no Award may be sold, transferred, pledged, assigned, or otherwise alienated or hypothecated, other than by will or the laws of descent and distribution or pursuant to a domestic relations order, unless and until such Award has been exercised, or the Shares underlying such Award have been issued, and all restrictions applicable to such Shares have lapsed;

(ii) no Award or interest or right therein shall be liable for or otherwise subject to the debts, contracts or engagements of the Participant or the Participant's successors in interest or shall be subject to disposition by transfer, alienation, anticipation, pledge, hypothecation, encumbrance, assignment or any other means whether such disposition be voluntary or involuntary or by operation of law by judgment, levy, attachment, garnishment or any other legal or equitable proceedings (including bankruptcy) unless and until such Award has been exercised, or the Shares underlying such Award have been issued, and all restrictions applicable to such Shares have lapsed, and any attempted disposition of an Award prior to satisfaction of these conditions shall be null and void and of no effect, except to the extent that such disposition is permitted by Section 13.4(a)(i); and

(iii) during a Participant's lifetime, only the Participant or the Participant's guardian or legal representative may exercise an Award (or any portion thereof) granted to him or her under the Plan, unless it has been disposed of pursuant to a domestic relations order. After a Participant's death, any exercisable portion of an Award may, prior to the time when such portion becomes unexercisable under the Plan or the applicable Award Agreement, be exercised by such Participant's personal representative or by any person empowered to do so under the deceased Participant's will or under the then applicable laws of descent and distribution.

(b) Notwithstanding Section 13.4(a), the Committee, in its sole discretion, may determine to permit a Participant or a Permitted Transferee of such Participant to transfer an Award other than an Incentive Stock Option (unless such Incentive Stock Option is intended to become a Non-Qualified Stock Option) to any one or more Permitted Transferees of such Participant without consideration, subject to the following terms and conditions: (i) an Award transferred to a Permitted Transferee shall not be assignable or transferable by the Permitted Transferee other than (A) to another Permitted Transferee of the applicable Participant or (B) by will or the laws of descent and distribution or, subject to the consent of the Committee, pursuant to a domestic relations order; (ii) an Award transferred to a Permitted Transferee shall continue to be subject to all the terms and conditions of the Award as applicable to the original Participant (other than the ability to further transfer the Award to any person other than another Permitted Transferee of the applicable Participant); and (iii) the Participant (or transferring Permitted Transferee) and the receiving Permitted Transferee shall execute any and all documents requested by the Committee, including, without limitation documents to (A) confirm the status of the transferee as a Permitted Transferee, (B) satisfy any requirements for an exemption for the transfer under Applicable Law and (C) evidence the transfer. In addition, and further notwithstanding Section 13.4(a), hereof, the Committee, in its sole discretion, may determine to permit a Participant to transfer Incentive Stock Options to a trust that constitutes a Permitted Transferee if, under Section 671 of the Code and other Applicable Law, the Participant is considered the sole beneficial owner of the Incentive Stock Option while it is held in the trust.

13.5 Beneficiaries. Notwithstanding Section 13.4, if provided in the applicable Award Agreement, a Participant may, in the manner determined by the Committee, designate a beneficiary to exercise the rights of the Participant and to receive any distribution with respect to any Award upon the Participant's death. A beneficiary, legal guardian, legal representative, or other person claiming any rights pursuant to the Plan is subject to all terms and conditions of the Plan and any Award Agreement applicable to the Participant, except to the extent the Plan and Award Agreement otherwise provide, and to any additional restrictions deemed necessary or appropriate by the Committee. If the Participant is married and resides in a community property state, a designation of a person other than the Participant's spouse as his or her beneficiary with respect to more than fifty percent (50%) of the Participant's interest in the Award shall not be effective without the prior written consent of the Participant's spouse. If no beneficiary has been designated or survives the Participant, payment shall be made to the person entitled thereto pursuant to the Participant's will or the laws of descent and distribution. Subject to the foregoing, a beneficiary designation may be changed or revoked by a Participant at any time provided the change or revocation is filed with the Committee.

13.6 Forfeiture Events/Representations. The Committee may specify in an Award Agreement at the time of the Award that the Participant's rights, payments and benefits with respect to an Award shall be subject to reduction, cancellation, forfeiture or recoupment upon the occurrence of certain specified events, in addition to any otherwise applicable vesting or performance conditions of an Award. Such events shall include, but shall not be limited to, termination of service for Cause, violation of material Company policies, breach of noncompetition, confidentiality or other restrictive covenants that may apply to the Participant, or other conduct by the Participant that is detrimental to the business or reputation of the Company. The Committee may also specify in an Award Agreement that the Participant's rights, payments and benefits with respect to an Award shall be conditioned upon the Participant making a representation regarding compliance with noncompetition, confidentiality or other restrictive covenants that may apply to the Participant and providing that the Participant's rights, payments and benefits with respect to an Award shall be subject to reduction, cancellation, forfeiture or recoupment on account of a breach of such representation. In addition and without limitation of the foregoing, any amounts paid hereunder shall be subject to recoupment in accordance with The Dodd–Frank Wall Street Reform and Consumer Protection Act and any implementing regulations thereunder, any “clawback” policy adopted by the Company or as is otherwise required by applicable law or stock exchange listing condition.

Awards under the Plan shall be subject to the Company's clawback policy, as in effect from time to time. If there shall be no such clawback policy in effect, (1) awards under the Plan and any Shares issued pursuant to Awards under the Plan (and any gains thereon) shall be subject to recovery or “clawback” by the Company if and to the extent that the vesting of such Awards was determined or calculated based on materially inaccurate financial statements or any other material inaccurate performance metric criteria; or (2) if the Company or its Subsidiaries terminate a Participant's service relationship due to the Participant's gross negligence or willful misconduct, or determine there are grounds for such a termination (whether or not such actions also constitute “cause” under an Award Agreement), any Awards under the Plan, whether or not vested, as well as any shares of Stock issued pursuant to Awards under this Plan (and any gains thereon) shall be subject to forfeiture, recovery and “clawback.” Notwithstanding anything to the contrary contained herein, if a Participant has engaged in any detrimental activity (including noncompliance with restrictive covenants), as determined by the Committee, the Committee may, in its sole discretion, provide for cancellation of any or all of such Participant's outstanding Awards and/or forfeiture by the Participant of any gain realized in respect of Awards, and repayment of any such gain promptly to the Company.

13.7 No Fractional Shares. No fractional Shares shall be issued or delivered pursuant to the Plan or any Award. The Committee shall determine whether cash, Awards, or other property shall be issued or paid in lieu of fractional Shares or whether such fractional Shares or any rights thereto shall be forfeited or otherwise eliminated.

13.8 Reservation of Stock. The Company shall at all times during the term of the Plan and any outstanding Awards granted hereunder reserve or otherwise keep available such number of Shares of Stock as will be sufficient to satisfy the requirements of the Plan (if then in effect) and the Awards and shall pay all fees and expenses necessarily incurred by the Company in connection therewith.

13.9 Reimbursement of Company for Unearned or Ill-gotten Gains. Unless otherwise specifically provided in an Award Agreement, and to the extent permitted by Applicable Law, if the Company is required to prepare an accounting restatement due to the material noncompliance of the Company with any financial reporting requirement under the securities laws, the Committee may, without obtaining the approval or consent of the Company's shareholders or of any Participant, require that any Participant who personally engaged in one of more acts of fraud or misconduct that have caused or partially caused the need for such restatement or any current or former chief executive officer, chief financial officer, or executive officer, regardless of their conduct, to reimburse the Company in a manner consistent with Section 409A of the Code, if the Award constitutes “Non-Qualified Deferred Compensation,” for all or any portion of any Awards granted or settled under this Plan (with each such case being a “Reimbursement”), or the Committee may require the

termination or rescission of, or the recapture associated with, any Award, in excess of the amount the Participant would have received under the accounting restatement.

13.10 Delay in Payment. To the extent required in order to avoid the imposition of any interest and/or additional tax under Section 409A(a)(1)(B) of the Code, any amount that is considered deferred compensation under the Plan or Award Agreement and that is required to be postponed pursuant to Section 409A of the Code, following the a Participant's Termination of Employment shall be delayed for six (6) months if a Participant is deemed to be a "specified employee" as defined in Section 409A(a)(2)(i)(B) of the Code; provided that, if the Participant dies during the postponement period prior to the payment of the postponed amount, the amounts withheld on account of Section 409A of the Code shall be paid to the executor or administrator of the decedent's estate within 60 days following the date of his death. A "Specified Employee" means any Participant who is a "key employee" (as defined in Section 416(i) of the Code without regard to paragraph (5) thereof), as determined by the Company in accordance with its uniform policy with respect to all arrangements subject to Section 409A of the Code, based upon the twelve (12) month period ending on each December 31st (the "Identification Period"). All Participants who are determined to be key employees under Section 416(i) of the Code (without regard to paragraph (5) thereof) during the identification period shall be treated as Specified Employees for purposes of the Plan during the twelve (12) month period that begins on the first day of the 4th month following the close of such identification period.

Article 14 Successors

All obligations of the Company under the Plan, with respect to Awards granted hereunder, shall be binding on any successor to the Company, whether the existence of such successor is the result of a direct or indirect purchase, merger, consolidation, or otherwise, of all or substantially all of the business and/or assets of the Company.

Article 15 Miscellaneous Provisions

15.1 Substitute Awards in Corporate Transactions. Nothing contained in the Plan shall be construed to limit the right of the Committee to grant Awards under the Plan in connection with the acquisition, whether by purchase, merger, consolidation or other corporate transaction, of the business or assets of any corporation or other entity. Without limiting the foregoing, the Committee may grant Awards under the Plan to an employee or director of another corporation who becomes an Eligible Person by reason of any such corporate transaction in substitution for awards previously granted by such corporation or entity to such person. The terms and conditions of the substitute Awards may vary from the terms and conditions that would otherwise be required by the Plan solely to the extent the Committee deems necessary for such purpose. Any shares of Stock subject to these substitute Awards shall not be counted against the share reserve set forth in Article 4 of the Plan.

15.2 409A Compliance. It is intended that all Awards issued under the Plan be in a form and administered in a manner that will comply with the requirements of Section 409A of the Code, or the requirements of an exception to Section 409A of the Code, and the Award Agreement and this Plan will be construed and administered in a manner that is consistent with and gives effect to such intent. The Committee is authorized to adopt rules or regulations deemed necessary or appropriate to qualify for an exception from or to comply with the requirements of Section 409A of the Code. With respect to an Award that constitutes a deferral of compensation subject to Section 409A of the Code: (a) if any amount is payable under such Award upon a termination of service, a termination of service will be treated as having occurred only at such time the Participant has experienced a "separation from service" as such term is defined for purposes of Section 409A of the Code; (b) if any amount is payable under such Award upon a disability, a disability will be treated as having occurred only at such time the Participant has experienced a "disability" as such term is defined for purposes of Section 409A of the Code; (c) if any amount is payable under such Award on account of the occurrence of a Change in Control, a Change in Control will be treated as having occurred only at such time a "change in the ownership or effective control of the corporation or in the ownership of a substantial portion of the assets of the corporation" has occurred as such terms are defined for purposes of Section 409A of the Code, (d) if any amount becomes payable under such Award on account of a Participant's separation from service at such time as the Participant is a "specified employee" within the meaning of Section 409A of the Code, then no payment shall be made, except as permitted under Section 409A of the Code, prior to the first business day after the earlier of (i) the date that is six months after the date of the Participant's separation from service or (ii) the Participant's death, (e) any right to receive any installment payments under this Plan shall be treated as a right to receive a series of separate payments and, accordingly, each installment payment hereunder shall at all times be considered a separate and distinct payment, and (f) no amendment to or payment under such Award will be made except and only to the extent permitted under Section 409A of the Code.

Notwithstanding the foregoing, the tax treatment of the benefits provided under the Plan or any Award Agreement is not warranted or guaranteed, and in no event shall the Company be liable for all or any portion of any taxes, penalties, interest or other expenses that may be incurred by the Participant on account of non-compliance with Section 409A of the Code.

15.3 Section 16(b) of the Exchange Act. All elections and transactions under the Plan by persons subject to Section 16 of the Exchange Act involving shares of Stock are intended to comply with any applicable exemptive condition under Rule 16b-3. The Committee may, in its sole discretion, establish and adopt written administrative guidelines, designed to facilitate compliance with Section 16(b) of the Exchange Act, as it may deem necessary or proper for the administration and operation of the Plan and the transaction of business thereunder.

15.4 Unfunded Status of the Plan. The Plan is intended to constitute an “unfunded” plan for incentive compensation, and the Plan is not intended to constitute a plan subject to the provisions of ERISA. With respect to any payments not yet made to a Participant by the Company, nothing contained herein shall give any such Participant any rights that are greater than those of a general creditor of the Company. In its sole discretion, the Committee may authorize the creation of trusts or other arrangements to meet the obligations created under the Plan to deliver Stock or payments with respect to Options, Stock Appreciation Rights and other Awards hereunder, provided, however, that the existence of such trusts or other arrangements is consistent with the unfunded status of the Plan.

15.5 Nonexclusivity of the Plan. Neither the adoption of the Plan by the Board nor the submission of the Plan to the stockholders of the Company shall be construed as creating any limitations on the power of the Board to adopt such other incentive arrangements as it may deem desirable, including without limitation, the granting of stock options and restricted stock other than under the Plan, and such arrangements may be either applicable generally or only in specific cases.

15.6 Investment Representations. The Company shall be under no obligation to issue any shares covered by any Award unless the shares to be issued pursuant to Awards granted under the Plan have been effectively registered under the Securities Act of 1933, as amended, or the Participant shall have made such written representations to the Company (upon which the Company believes it may reasonably rely) as the Company may deem necessary or appropriate for purposes of confirming that the issuance of such shares will be exempt from the registration requirements of that Act and any applicable state securities laws and otherwise in compliance with all applicable laws, rules and regulations, including but not limited to that the Participant is acquiring the shares for his or her own account for the purpose of investment and not with a view to, or for sale in connection with, the distribution of any such shares.

15.7 Registration. If the Company shall deem it necessary or desirable to register under the Securities Act of 1933, as amended or other applicable statutes any Shares of Stock issued or to be issued pursuant to Awards granted under the Plan, or to qualify any such Shares of Stock for exemption from the Securities Act of 1933, as amended or other applicable statutes, then the Company shall take such action at its own expense. The Company may require from each recipient of an Award, or each holder of Shares of Stock acquired pursuant to the Plan, such information in writing for use in any registration statement, prospectus, preliminary prospectus or offering circular as is reasonably necessary for that purpose and may require reasonable indemnity to the Company and its officers and directors from that holder against all losses, claims, damage and liabilities arising from use of the information so furnished and caused by any untrue statement of any material fact therein or caused by the omission to state a material fact required to be stated therein or necessary to make the statements therein not misleading in the light of the circumstances under which they were made. In addition, the Company may require of any such person that he or she agree that, without the prior written consent of the Company or the managing underwriter in any public offering of Shares of Stock, he or she will not sell, make any short sale of, loan, grant any option for the purchase of, pledge or otherwise encumber, or otherwise dispose of, any shares of Stock during the 180 day period commencing on the effective date of the registration statement relating to the underwritten public offering of securities. Without limiting the generality of the foregoing provisions of this Section 15.7, if in connection with any underwritten public offering of securities of the Company the managing underwriter of such offering requires that the Company’s directors and officers enter into a lock-up agreement containing provisions that are more restrictive than the provisions set forth in the preceding sentence, then (a) each holder of shares of Stock acquired pursuant to the Plan (regardless of whether such person has complied or complies with the provisions of clause (b) below) shall be bound by, and shall be deemed to have agreed to, the same lock-up terms as those to which the Company’s directors and officers are required to adhere; and (b) at the request of the Company or such managing underwriter, each such person shall execute and deliver a lock-up agreement in form and substance equivalent to that which is required to be executed by the Company’s directors and officers.

15.8 Placement of Legends; Stop Orders; etc. Each share of Stock to be issued pursuant to Awards granted under the Plan may bear a reference to the investment representation made in accordance with Section 15.6 in addition to any other applicable restriction under the Plan, the terms of the Award and to the fact that no registration statement has been filed with the Securities and Exchange Commission in respect to such shares of Stock. All shares of Stock or other securities delivered under the Plan shall be subject to such stock transfer orders and other restrictions as the Committee may deem advisable under the rules, regulations, and other requirements of any stock exchange upon which the Stock is then listed, and any applicable federal or state securities law, and the Committee may cause a legend or legends to be put on any certificates or recorded in connection with book-entry accounts representing the shares to make appropriate reference to such restrictions.

15.9 Uncertificated Shares. To the extent that the Plan provides for issuance of certificates to reflect the transfer of Shares, the transfer of such Shares may be effected on a noncertificated basis, to the extent not prohibited by Applicable Law.

15.10 Limitation of Rights in Stock. A Participant shall not be deemed for any purpose to be a stockholder of the Company with respect to any of the Shares of Stock subject to an Award, unless and until Shares shall have been issued therefor and delivered to the Participant or his agent. Any Stock to be issued pursuant to Awards granted under the Plan shall be subject to all restrictions upon the transfer thereof which may be now or hereafter imposed by the Certificate of Incorporation and the Bylaws of the Company.

15.11 Employment Not Guaranteed. Nothing in the Plan shall interfere with or limit in any way the right of the Company (or any Affiliate) to terminate any Participant's Employment at any time, nor confer upon any Participant any right to continue in the employ of the Company (or any Affiliate), subject to the terms of any separate employment or consulting agreement or provision of law or corporate articles or by-laws to the contrary, at any time to terminate such employment or consulting agreement or to increase or decrease, or otherwise adjust, the other terms and conditions of the recipient's employment or other association with the Company and its Affiliates.

15.12 Other Compensation Arrangements. Nothing contained in this Plan shall prevent the Board from adopting other or additional compensation arrangements, subject to shareholder approval if such approval is required; and such arrangements may be either generally applicable or applicable only in specific cases.

15.13 Gender and Number. Except where otherwise indicated by the context, any masculine term used herein also shall include the feminine; the plural shall include the singular and the singular shall include the plural.

15.14 Plan Headings. The headings in the Plan are for purposes of convenience only and are not intended to define or limit the construction of the provisions thereof.

15.15 Severability. In the event any provision of the Plan shall be held illegal or invalid for any reason, the illegality or invalidity shall not affect the remaining parts of the Plan, and the Plan shall be construed and enforced as if the illegal or invalid provision had not been included.

15.16 Requirements of Law. The granting of Awards and the issuance of Shares under the Plan shall be subject to Applicable Law and to such approvals by any governmental agencies or national securities exchanges as may be required.

15.17 Errors. At any time the Company may correct any error made under the Plan without prejudice to the Company. Such corrections may include, among other things, changing or revoking an issuance of an Award.

15.18 Elections and Notices. Notwithstanding anything to the contrary contained in this Plan, all elections and notices of every kind shall be made on forms prepared by the Company or the general counsel, secretary or assistant secretary, or their respective delegates or shall be made in such other manner as permitted or required by the Company or the general counsel, secretary or assistant secretary, or their respective delegates, including but not limited to elections or notices through electronic means, over the Internet or otherwise. An election shall be deemed made when received by the Company (or its designated agent, but only in cases where the designated agent has been appointed for the purpose of receiving such election), which may waive any defects in form. The Company may limit the time an election may be made in advance of any deadline.

Where any notice or filing required or permitted to be given to the Company under the Plan, it shall be delivered to the principal office of the Company, directed to the attention of the general counsel of the Company or his or her successor. Such notice shall be deemed given on the date of delivery.

Notice to the Participant shall be deemed given when mailed (or sent by telecopy) to the Participant's work or home address as shown on the records of the Company or, at the option of the Company, to the Participant's e-mail address as shown on the records of the Company.

It is the Participant's responsibility to ensure that the Participant's addresses are kept up to date on the records of the Company. In the case of notices affecting multiple Participants, the notices may be given by general distribution at the Participants' work locations.

15.19 Governing Law. To the extent not preempted by Federal law, the Plan, and all awards and agreements hereunder, and any and all disputes in connection therewith, shall be governed by and construed in accordance with the substantive laws of the State of Delaware, without regard to conflict or choice of law principles which might otherwise refer the construction, interpretation or enforceability of this Plan to the substantive law of another jurisdiction.

15.20 Venue. The Company and the Participant to whom an Award under this Plan is granted, for themselves and their successors and assigns, irrevocably submit to the exclusive and sole jurisdiction and venue of the state or federal courts of Delaware with respect to any and all disputes arising out of or relating to this Plan, the subject matter of this Plan or any awards under this Plan, including but not limited to any disputes arising out of or relating to the interpretation and enforceability of any awards or the terms and conditions of this Plan. To achieve certainty regarding the appropriate forum in which to prosecute and defend actions arising out of or relating to this Plan, and to ensure consistency in application and interpretation of the Governing Law to the Plan, the parties agree that (a) sole and exclusive appropriate venue for any such action shall be an appropriate federal or state court in Delaware, and no other, (b) all claims with respect to any such action shall be heard and determined exclusively in such Delaware court, and no other, (c) such Delaware court shall have sole and exclusive jurisdiction over the person of such parties and over the subject matter of any dispute relating hereto and (d) that the parties waive any and all objections and defenses to bringing any such action before such Delaware court, including but not limited to those relating to lack of personal jurisdiction, improper venue or *forum non conveniens*.

15.21 No Obligation to Notify. The Company shall have no duty or obligation to any holder of an Option to advise such holder as to the time or manner of exercising such Option. Furthermore, the Company shall have no duty or obligation to warn or otherwise advise such holder of a pending transaction or expiration of an Option or a possible period in which the Option may not be exercised. The Company has no duty or obligation to minimize the tax consequences of an Option to the holder of such Option.

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549**

FORM 10-K

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

**For the fiscal year ended December 31, 2024
or**

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

For the transition period from to

Commission File Number 001-33957

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

Delaware
(State or other jurisdiction of Incorporation or organization)

04-3306140
(I.R.S. Employer Identification No.)

84 October Hill Road, Holliston, Massachusetts 01746
(Address of Principal Executive Offices, including 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 Global Market

Securities registered pursuant to Section 12(g) of the Act:
None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.
Yes ☐ No ☒

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act.
Yes ☐ No ☒

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

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§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 ☐

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

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 has filed a report on and attestation to its management’s assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements. ☐

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant’s executive officers during the relevant recovery period pursuant to § 240.10D-1(b). ☐

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

The aggregate market value of shares of voting common equity held by non-affiliates of the registrant as of June 28, 2024, the last business day of the registrant’s most recently completed second fiscal quarter, was approximately \$115.2 million based on the closing sales price of the registrant’s common stock, par value \$0.01 per share on that date. At March 5, 2025, there were 44,074,475 shares of the registrant’s common stock issued and outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Company’s definitive Proxy Statement in connection with the 2025 Annual Meeting of Stockholders (the “Proxy Statement”), to be filed within 120 days after the end of the Registrant’s fiscal year, are incorporated by reference into Part III of this Form 10-K. Except with respect to information specifically incorporated by reference in this Form 10-K, the Proxy Statement is not deemed to be filed as part hereof.

HARVARD BIOSCIENCE, INC.
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For the Year Ended December 31, 2024
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This Annual Report on Form 10-K 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 1: Business” and “Item 7: 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, financial performance, or achievements to be materially different from any future results, financial 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. We discuss many of these risks in detail under the heading “Item 1A. Risk Factors” of this Annual Report on Form 10-K. Given these risks and uncertainties, you should not place undue reliance on our forward-looking statements. You should carefully review all of these factors, as well as other risks described in our public filings, and you should be aware that there may be other factors, including factors of which we are not currently aware, that could cause these differences. Also, these forward-looking statements represent our estimates and assumptions only as of the date of this report. 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. Harvard Bioscience, Inc. is referred to herein as “we,” “our,” “us,” and “the Company.”

PART I

Item 1. Business.

Overview

Harvard Bioscience, Inc., a Delaware corporation, is a leading developer, manufacturer and seller of technologies, products and services that enable fundamental advances in life science applications, including research, drug and therapy discovery, bioproduction and preclinical testing for pharmaceutical and therapy development. Our products and services are sold globally to customers ranging from renowned academic institutions and government laboratories to the world’s leading pharmaceutical, biotechnology and contract research organizations (“CROs”). With operations in the United States, Europe and China, we sell through a combination of direct and distribution channels to customers around the world.

Our History and Strategy

Our business began in 1901, under the name Harvard Apparatus. It was founded by Dr. William T. Porter, a Professor of Physiology at Harvard Medical School and a pioneer of physiology education. We have grown over the years with the development and evolution of modern life science research and education. Our early inventions included ventilators based on Dr. Porter’s design, the mechanical syringe pump for drug infusion in the 1950s, and the microprocessor-controlled syringe pump in the 1980s. In 1996, a group of investors acquired a majority of the then existing business of our predecessor, Harvard Apparatus, Inc. Harvard Bioscience, Inc. was incorporated in the State of Delaware in September 2000 and became the successor entity to Harvard Apparatus, Inc. by merger in November 2000. In 2018, we acquired Data Sciences International, Inc. (“DSI”), a global leader in products, services and solutions focused on preclinical testing. The DSI product portfolio, which is largely complementary to our cellular and molecular technology (“CMT”) product portfolio, expanded our product portfolio to address the continuum from research and discovery to preclinical testing with principal applications in drug and therapy testing.

Our strategy for driving revenue growth is focused in the following three areas.

- First, we intend to maintain and strengthen our established base business in the areas of therapy research and pre-clinical testing. This includes expanding our product offerings to address the needs of higher-volume industrial customers such as CROs, biotechnology and pharmaceutical companies, and government laboratories engaged in the development and testing of new therapeutics, where the ability to reduce costs and improve cycle times in pre-clinical testing has the potential to drive additional demand.

- Second, we are expanding our product offerings for biotechnology and pharmaceutical customers in the field of bioproduction, where we believe there are opportunities to provide innovative products and services that bridge from research and development to production in applications that scale with production volume.
- Third, we are expanding our product offerings in the emerging field of organoid research and testing. Organoids, which serve as *in vitro* models that emulate human organs, provide new opportunities for academic research and for streamlined testing early in the pharmaceutical development cycle, especially in the area of neurological and cardiac research and testing. We believe that our microelectrode array products, including our recently introduced MeshMEA™ system, will be attractive to a range of customers, including academic researchers as well as biotechnology, pharmaceutical, and CRO customers engaged in therapy, discovery, development and testing.

In addition, we have taken steps to rationalize our product portfolio and improve our operating cost structure. These activities have included the discontinuation of certain non-strategic products, the consolidation of our global operating footprint, and the reduction of our headcount in Europe and North America. In 2024, we also consolidated our enterprise resource planning (“ERP”) system in the United States. We believe that these actions will allow us to focus on product opportunities that drive sustainable revenue growth with attractive gross margins and improved profitability.

Our Products

Our products, consumables, software and services enable fundamental advances in life science applications, including research, pharmaceutical and therapy discovery, bioproduction and preclinical testing.

We have organized our product line activities into two product families, CMT and Preclinical. Our CMT product family is primarily composed of products supporting research related to molecular, cellular, organ and organoid technologies. Our CMT products also have application in the emerging field of bioproduction of pharmaceuticals and therapeutics as well as in *in vitro* testing of cell lines and organoids in the therapy development. The principal customers for our CMT products include academic and government laboratories, biotechnology and pharmaceutical companies, and CROs. Our Preclinical product family includes products that support the preclinical research and testing phase for drug development, and in particular testing related to data collection and analysis for safety and regulatory compliance. Preclinical products are primarily sold to pharmaceutical and biotechnology companies and CROs, as well as to larger academic laboratories.

Our solutions range from simple to complex, and generally consist of hardware/firmware and software products, augmented with consumables, options, upgrades and post-sales (scientific, installation and data) services. Sales prices of these products and services range typically from \$1,000 to over \$100,000.

Below is a description of each product family.

Cellular and Molecular Technologies (“CMT”) Product Family

Our CMT product family includes products designed primarily to support academic research and the discovery phase of new drug development. The CMT product family includes the Harvard Apparatus, Biochrom, BTX, HEKA, KD Scientific, MCS and Warner brands. CMT products include:

- electroporation and electrofusion instruments, including the bioproduction configuration of our BTX electroporation system, which leverages our electroporation technology to bridge from therapy to production in the emerging field of bioproduction;
- amino acid analyzers which support protein analysis of buffers and solutions in clinical and bioproduction environments;
- spectrophotometers and other equipment which primarily support molecular level testing and research;
- high precision syringe and peristaltic pumps for infusion applications in research;
- precision scientific measuring instrumentation and equipment in the field of electrophysiology such as: data acquisition systems with custom amplifier configurations for cellular analysis, complete micro electrode array solutions for in vivo recordings and in vitro systems for extracellular recordings; and
- our recently introduced MeshMEA™ system, which builds on our existing micro-electrode array technology to support the emerging field of organoid research, especially in the areas of cardiac and neurological research and testing.

Sales of our CMT product family made up approximately 49% of our global revenues for each of the years ended December 31, 2024 and 2023.

Preclinical Product Family

Our Preclinical product family provides a complete platform to assess physiological data from organisms for research ranging from basic research to drug discovery, and drug development services. The Preclinical product family includes the DSI, Panlab, Hugo Sachs and Buxco brands. It includes:

- implantable and externally worn telemetry systems, which are commonly used in research to collect cardiovascular, central nervous system, respiratory, metabolic data; including our new SoHo™ Small Animal Implantable Telemetry System that enables data collection in high-density group housing environments;
- behavioral products; isolated organ and surgical products, a broad range of instruments and accessories for tissue, organ-based lab research, including surgical products, infusion systems, and behavior research systems;
- turn-key respiratory system solutions encompassing plethysmograph chambers, data acquisition hardware, physiological signal analysis software, and final report generation;
- inhalation and exposure systems providing precise, homogenous aerosol delivery for up to 42 subjects, while integrating respiratory parameters for the ultimate delivered dose system;
- powerful GLP-capable data acquisition and analysis systems, capable of integrating third party sensors for a more comprehensive study design; and
- our VivaMars™ behavioral monitoring system, launched in 2023, which is directed to the high throughput testing needs of higher-volume industrial customers such as CROs, biotechnology and pharmaceutical companies, and government laboratories engaged in the development and testing of new therapeutics.

Sales of our Preclinical product family made up approximately 51% of our global revenues for each of the years ended December 31, 2024 and 2023.

Other Products

In addition to our proprietarily manufactured products, we distribute products developed by other manufacturers. Resale of such products enables us to act as a single source for our customers' research needs. They

consist primarily of instruments or accessories as well as consumables used in experiments involving fluid handling, molecular and cell analysis and tissue, organ and animal research. Sales of third-party products that we distribute accounted for approximately 12% and 13% of our revenues for the years ended December 31, 2024 and 2023, respectively.

Customers

Our end-user customers are primarily pharmaceutical and biotechnology companies, universities, hospitals, government laboratories, including laboratories operated by the United States National Institutes of Health ("NIH"), U.S. Army and CROs. Our pharmaceutical and biotechnology customers include pharmaceutical companies and research laboratories such as Abbott, Amgen, AstraZeneca, Bayer, Glaxo Smith Kline, Johnson & Johnson, Merck, Novartis, Pfizer and Regeneron. Our academic customers include colleges and universities such as Baylor College of Medicine, Cambridge University, Harvard University, Imperial College of London, Johns Hopkins University, Stanford, the University of California system, University of Pennsylvania, University of Pittsburgh, University of Texas and Yale University. Our CRO customers include Charles River Laboratories, Labcorp and Wuxi AppTec. We have a wide range of U.S. and international customers, and no customer accounted for more than 10% of our revenues in 2024.

Sales

We conduct direct sales and sales through distributors in the United States, China and major European markets. We engage distributors for the sales of our own branded and private label products in certain areas of the world and for certain product lines. For the year ended December 31, 2024, revenues from direct sales to end-users represented approximately 63% of our revenues; and revenues from sales of our products through distributors represented approximately 37% of our revenues.

Marketing

Our marketing activities encompass product management and marketing communications. Marketing maintains value-proposition based product roadmaps, collaborates with research and development on timing and investment for new products, develops marketing and sales strategies, supports direct and distributor sales activities, and sets the global pricing of our products. Our marketing team also maintains digital presence across the web and social media platforms, creates electronic leads and analyzes opportunities for new product portfolio extensions. Our websites and marketing collateral serve as the primary sales tool for our product lines, which includes both proprietary manufactured products and complementary products from various suppliers.

Research and Development

Our research and development activities are focused primarily on maintaining and strengthening our existing product and technology portfolio and expanding our portfolio to support new opportunities consistent with our growth strategy. We maintain development staff in many of our manufacturing facilities to design and develop new products and to re-engineer existing products to bring them to the next generation. Our research and development expenses were approximately \$10.4 million and \$11.8 million for the years ended December 31, 2024 and 2023, respectively. We anticipate that we will continue to make investments in research and development activities to advance our position in the industry as a provider of life science equipment, software and services. We plan to pursue a balanced development portfolio strategy of originating new products from internal research and evaluate acquiring products and technologies through business and technology acquisitions or collaborations, as appropriate.

Manufacturing

We manufacture and test the majority of our products in our principal manufacturing facilities located in the United States, Germany and Spain. We have considerable manufacturing flexibility at our various facilities, and each facility can manufacture multiple products at the same time. We maintain in-house manufacturing expertise, technologies and resources. We seek to maintain multiple suppliers for key components that are not manufactured in-house, although some of our products are dependent on sole-source suppliers. The consolidation of our ERP system, which we completed during 2024, is expected to enable operational improvements in our sales and operations planning processes and management of inventory levels and customer service. Our manufacturing operations primarily involve assembly and testing activities along with some machine-based processes. Going forward we will continue to evaluate our manufacturing facilities and operations in order to optimize our manufacturing footprint. See “Part I, Item 2. Properties” of this report for additional information regarding our manufacturing facilities.

Competition

The markets into which we sell our products are highly competitive, and we expect the intensity of competition to continue or increase. We compete with many companies engaged in developing and selling tools for life science research. Many of our competitors have greater financial, operational, sales and marketing resources and more experience in research and development and commercialization than we have. Moreover, our competitors may have broader product offerings and greater name recognition than we do, and many offer discounts as a competitive tactic. These competitors and other companies may have developed or in the future could develop new technologies that compete with our products, which could render our products obsolete. We cannot provide assurance that we will be able to make the enhancements to our technologies necessary to compete successfully with newly emerging technologies. While we provide a broad selection of differentiated products, we have numerous competitors across our product lines. We believe that we compete favorably with our competitors on the basis of product performance, including quality, reliability, speed, technical support, price and delivery time.

We compete with several companies that provide products for life science research including Agilent, Becton, Dickinson and Company, Bio-Rad Laboratories, Inc., Danaher Corporation, Emka Technologies, Eppendorf AG, Hitachi, Instem plc, Kent Scientific Corporation, Lonza Group Ltd., PerkinElmer, Inc., Thermo Fisher Scientific, Inc., TSE Systems and Waters Corporation.

We cannot forecast if or when these or other companies may develop competitive products. We expect that other products will compete with our products and potential products based on efficacy, safety, cost and intellectual property positions. While we believe that these will be the primary competitive factors, other factors include, in certain instances, the availability of supply, manufacturing, marketing and sales expertise and capability.

Seasonality

Sales and earnings in our third quarter are usually flat or down from the second quarter primarily because there are a large number of holidays and vacations during such quarter, especially in Europe. Our fourth quarter revenues and earnings are often the highest in any fiscal year compared to the other three quarters, primarily because many of our customers tend to spend budgeted money before their own fiscal year ends.

Intellectual Property

To establish and protect our proprietary technologies and products, we rely on a combination of patent, copyright, trademark and trade secret laws, as well as confidentiality provisions in our contracts. Patents or patent applications cover certain of our new technologies. Most of our product lines are protected principally by trade names and trade secrets.

We have implemented a patent strategy designed to provide us with freedom to operate and facilitate commercialization of our current and future products. Our success depends, to a significant degree, upon our ability to develop proprietary products and technologies. We intend to continue to file patent applications covering new products and technologies where it is appropriate to do so taking into account factors such as the likely scope of coverage, strategic value, and cost.

Patents provide some degree of protection for our intellectual property. However, the assertion of patent protection involves complex legal and factual determinations and is therefore uncertain. The scope of any of our issued patents may not be sufficiently broad to offer meaningful protection. In addition, our issued patents or patents licensed to us may be successfully challenged, invalidated, circumvented or unenforceable so that our patent rights would not create an effective competitive barrier. Moreover, the laws of some foreign countries may protect our proprietary rights to a greater or lesser extent than the laws of the United States. In addition, the laws governing patentability and the scope of patent coverage continue to evolve, particularly in areas of interest to us. As a result, there can be no assurance that patents will be issued from any of our patent applications or from applications licensed to us. As a result of these factors, our intellectual property positions bear some degree of uncertainty.

We also rely in part on trade secret protection of our intellectual property. We attempt to protect our trade secrets by entering into confidentiality agreements with third parties, employees and consultants. Our employees and consultants also sign agreements requiring that they assign to us their interests in patents and copyrights arising from their work for us. Although many of our United States employees have signed agreements not to compete unfairly with us during their employment and after termination of their employment, through the misuse of confidential information, soliciting employees, soliciting customers and the like, the enforceability of these provisions varies from jurisdiction to jurisdiction and, in some circumstances, they may not be enforceable. In addition, it is possible that these agreements may be breached or invalidated and if so, there may not be an adequate corrective remedy available. Despite the measures we have taken to protect our intellectual property, we cannot provide assurance that third parties will not independently discover or invent competing technologies or reverse engineer our trade secrets or other technologies. Therefore, the measures we are taking to protect our proprietary rights may not be adequate.

We do not believe that our products infringe on the intellectual property rights of any third party. It is possible, however, that third parties will claim such infringement by us or our licensors with respect to current or future products. Any such claims, with or without merit, could be time-consuming, result in costly litigation and diversion of management's attention and resources, cause product shipment delays or require us to enter into royalty or licensing agreements. Moreover, such royalty or licensing agreements, if required, may not be on terms advantageous to us, or acceptable at all, which could seriously harm our business or financial condition.

"Harvard" is a registered trademark of Harvard University. The marks "Harvard Apparatus" and "Harvard Bioscience" are being used pursuant to a license agreement entered into in December 2002 between us and Harvard University.

Government Regulation

We are generally not subject to direct governmental regulation other than the laws and regulations generally applicable to businesses in the domestic and foreign jurisdictions in which we operate. Other than our amino acid analyzer products, which are registered with, but otherwise exempt from United States Food and Drug Administration ("U.S. FDA") pre-clearance requirements, our current products are not subject to pre-market clearance or approval by the U.S. FDA for use on human clinical patients. In addition, we believe we are materially in compliance with all relevant environmental laws.

Human Capital

As of December 31, 2024, we employed 355 employees, which included 330 full-time employees. Some of our employees in Europe have statutory collective bargaining rights. We have never experienced a general work stoppage or strike, and management believes that our relations with our employees are good. Additional information about our employees follows:

Country	Full-time	Part-time
United States	206	10
Germany	52	12
United Kingdom	26	3
Spain	20	-
China	16	-
Rest of World	10	-
Total	330	25

Function	Full-time	Part-time
Manufacturing	120	5
Sales and marketing	123	6
Research and development	40	8
General and administrative	47	6
Total	330	25

We make employment decisions without regard to age, color, national origin, citizenship status, physical or mental disability, race, religion, creed, gender, sex, sexual orientation, gender identity and/or expression, genetic information, marital status, status with regard to public assistance, veteran and military status or any other characteristic protected by federal, state or local law. We take steps to employ and advance in employment qualified protected veterans and qualified individuals with disabilities.

Geographic Area

Financial information regarding geographic areas in which we operate is provided in Notes 3 and 6 to the Consolidated Financial Statements included in “Part IV, Item 15. Exhibits, Financial Statement Schedules” of this report.

Available Information and Website

Our website address is www.harvardbioscience.com. Our Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and exhibits and amendments to those reports filed or furnished with the Securities and Exchange Commission pursuant to Section 13(a) of the Exchange Act are available for review on our website and the Securities and Exchange Commission’s website at www.sec.gov. Any such materials that we file with, or furnish to, the SEC in the future will be available on our website as soon as reasonably practicable after they are electronically filed with, or furnished to, the SEC. The information on our website is not incorporated by reference into this Annual Report on Form 10-K.

Item 1A. Risk Factors

The following factors should be reviewed carefully, in conjunction with the other information contained in this Annual Report on Form 10-K. As previously discussed, our actual results could differ materially from the information included in our forward-looking statements. Our business faces a variety of risks. These risks include those described below and may include additional risks and uncertainties not presently known to us or that we currently deem immaterial. If any of the events or circumstances described in the following risk factors occur or develop, our business operations, financial performance and financial condition could be materially and adversely affected, and the trading price of our common stock could decline.

Risks Related to Going Concern

There is substantial doubt about our ability to continue as a going concern.

As of December 31, 2024, there was indebtedness of \$37.4 million outstanding under our term loan and senior revolving credit facility (collectively, the “Credit Agreement”). We were not in compliance with the consolidated net leverage ratio covenant contained in the Credit Agreement as of the December 31, 2024 test date. On March 10, 2025, we entered into an amendment to the Credit Agreement (the “March 2025 Amendment”) pursuant to which the lenders and administrative agent agreed to waive such non-compliance, subject to the terms contained in the March 2025 Amendment. The March 2025 Amendment provides, among other things, that our failure to achieve certain refinancing milestones, including receipt of a term sheet or commitment letter from one or more potential lenders, by the dates provided in the March 2025 Amendment or our failure to consummate a refinancing of the Credit Agreement by June 30, 2025, would, in either case, constitute an event of default under the Credit Agreement. In such event, in addition to other actions our lenders may require, the amounts outstanding under the Credit Agreement may become immediately due and payable. See “Part II, Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations - Liquidity and Capital Resources” of this report for additional information regarding the March 2025 Amendment.

We are exploring alternative sources of capital that would allow us to refinance our outstanding indebtedness by June 30, 2025, in order to avoid default under the Credit Agreement, but our ability to access such other sources of capital is uncertain. There is no assurance that such capital will be available to us, be obtainable on commercially acceptable terms, or provide us with sufficient funds to meet our objectives. Based on our anticipated cash flows from operations, unless we are able to access other sources of capital or extend the date for repayment under the Credit Agreement, we will be unable to pay our debt obligations and fund our operations for at least twelve months from the date of issuance of the consolidated financial statements contained in this Annual Report on Form 10-K. As a result, there is substantial doubt about our ability to continue as a going concern.

As discussed in Note 2 to the Consolidated Financial Statements included in “Part IV, Item 15. Exhibits, Financial Statement Schedules” of this report, our consolidated financial statements include an explanatory paragraph that such financial statements were prepared assuming that we will continue as a going concern, continue our operations for the foreseeable future and realize assets and settle liabilities in the normal course of business. The financial statements do not give effect to any adjustments to the amounts and classification of assets and liabilities that may be necessary should we be unable to continue as a going concern. Such adjustments could be material.

Risks Related to Our Industry

The life sciences industry is very competitive.

We expect to encounter increased competition from both established and development-stage companies that continually enter the market. These include companies developing and marketing life science instruments, systems and lab consumables, health care companies that manufacture laboratory-based tests and analyzers, diagnostic and pharmaceutical companies, analytical instrument companies, and companies developing life science or drug discovery technologies. Currently, our principal competition comes from established companies that provide products that perform many of the same functions for which we market our products. Many of our competitors have substantially greater financial, operational, marketing and technical resources than we do. Moreover, these competitors may offer broader product lines and tactical discounts and may have greater name recognition. In addition, we may face competition from new entrants into the field. We may not have the financial resources, technical expertise or marketing, distribution or support capabilities to compete successfully in the future. In addition, we face changing customer preferences and requirements, including increased customer demand for more environmentally friendly products.

The life sciences industry is also subject to rapid technological change and discovery. The development of new or improved products, processes or technologies by other companies may render our products or proposed products obsolete or less competitive. In some instances, our competitors may develop or market products that are more effective or commercially attractive than our current or future products. To meet the evolving needs of customers, we must continually enhance our current products and develop and introduce new products. However, we may experience difficulties that may delay or prevent the successful development, introduction and marketing of new products or product enhancements. In addition, our product lines are based on complex technologies that are subject to change as new technologies are developed and introduced in the marketplace. We may have difficulty in keeping abreast of the changes affecting each of the different markets we serve or intend to serve, and our new products may not be accepted by the marketplace or may generate lower than anticipated revenues. Our failure to develop and introduce products in a timely manner in response to changing technology, market demands, or the requirements of our customers could cause our product sales to decline, and we could experience significant losses.

We offer, and plan to continue to offer, a broad range of products and have incurred, and expect to continue to incur, substantial expenses for the development of new products and enhancements to our existing products. The speed of technological change in our market may prevent us from being able to successfully market some or all of our products for the length of time required to recover development costs. Failure to recover the development costs of one or more products or product lines could decrease our profitability or cause us to experience significant losses.

A portion of our revenues is derived from customers in the pharmaceutical and biotechnology industries and is subject to the risks faced by those industries. Such risks may materially and adversely affect our financial results.

We derive a significant portion of our revenues from pharmaceutical and biotechnology companies and CROs serving these companies. We expect that pharmaceutical and biotechnology companies and CROs will continue to be a significant source of our revenues for the foreseeable future, including in our CMT and Preclinical product families. As a result, we are subject to risks and uncertainties that affect the pharmaceutical and biotechnology industries, such as government regulation, ongoing consolidation, uncertainty of technological change, and reductions and delays in research and development expenditures by companies in these industries.

In particular, the biotechnology industry is largely dependent on raising capital to fund its operations. If biotechnology companies that are our customers are unable to obtain the financing necessary to purchase our products, our business and results of operations could be materially and adversely affected. In addition, we are dependent, both directly and indirectly, upon general health care spending patterns, particularly in the research and development budgets of the pharmaceutical and biotechnology industries, as well as upon the financial condition and purchasing patterns of various governments and government agencies. As it relates to both the biotechnology and pharmaceutical industries, many companies have significant patents that have expired or are about to expire, which could result in reduced revenues for those companies. If pharmaceutical or biotechnology companies that are our customers suffer reduced revenues as a result of these patent expirations, they may be unable to purchase our products and our business and results of operations could be materially and adversely affected.

Changes in government regulations may reduce demand for our products, adversely impact our revenues, or increase our expenses.

We operate in many markets in which we and our customers must comply with federal, state, local and international regulations. We develop, configure and market our products to meet customer needs created by, and in compliance with, those regulations. These requirements include, among other things, regulations regarding manufacturing practices, product labeling, and advertising and post marketing reporting. We must incur expense and spend time and effort to ensure compliance with these complex regulations. Possible regulatory actions for non-compliance could include warning letters, fines, damages, injunctions, civil penalties, recalls, seizures of our products, and criminal prosecution. These actions could result in, among other things, substantial modifications to our business practices and operations; refunds, recalls, or seizures of our products; a total or partial shutdown of production in one or more of our facilities while we or our suppliers remedy the alleged violation; and withdrawals or suspensions of current products from the market. Any of these events could disrupt our business and have a material adverse effect on our revenues, profitability and financial condition.

Risks Related to Our Business

Reductions in customers' research budgets due to reductions in government funding or delays in government funding may adversely affect our business.

Many of our customers are universities, government research laboratories, private foundations and other institutions whose funding is dependent on both the level and timing of funding from government agencies such as the NIH and similar domestic and foreign agencies. These customers represent a significant portion of our revenue. The level of funding and reimbursement rates under government programs relied on by these customers is subject to the political process and is often unpredictable. For example, the NIH announced on February 7, 2025, a policy significantly reducing research grants by limiting payments for indirect overhead. Further, government proposals to reduce or eliminate budget deficits have sometimes included reduced allocations to the NIH and other government agencies that fund our customers' activities. Our revenue may be adversely affected if our customers forgo or delay purchases of our products and services as a result of uncertainties resulting from the NIH announcement or other government budget proposals, including reduced allocations to government agencies that fund our customers' activities. NIH funding may not be directed towards projects and studies that require the use of our products and services. These factors could adversely affect our business and financial results.

Our business is subject to economic, political and other risks associated with international sales and operations.

We manufacture and sell our products internationally and, as a result, our business is subject to risks associated with doing business internationally. A substantial amount of our revenues is derived from international operations, and we anticipate that a significant portion of our sales will continue to come from outside the United States in the future. We anticipate that revenues from international operations will likely continue to increase as a result of our efforts to expand our business in markets abroad. In addition, a number of our manufacturing facilities and suppliers are located outside the United States.

Our foreign operations subject us to certain risks, including: effects of fluctuations in foreign currency exchange rates; the impact of local economic conditions; fluctuations or reductions in economic growth in overseas markets including Asia and Europe; product preferences and seasonality and product requirements in foreign markets; difficulties in effectively establishing and expanding our business and operations in international markets; disruptions in foreign capital markets and trading markets; restrictions and potentially negative tax implications of transfers of capital across borders; differing labor regulations; the imposition of tariffs or import or export restrictions by the United States or foreign governments; other factors beyond our control, including potential political instability, terrorism, acts of war, natural disasters and diseases, pandemics; unexpected changes and increased enforcement of regulatory requirements and various state, federal and international, intellectual property, environmental, antitrust, anti-corruption, fraud and abuse (including anti-kickback and false claims laws) and employment laws; interruption to transportation flows for delivery of parts to us and finished goods to our customers; and laws and regulations on foreign investment in the United States under the jurisdiction of the Committee on Foreign Investment in the United States, or CFIUS, and other agencies, including the Foreign Investment Risk Review Modernization Act, or FIRRMA.

A small percentage of our products are subject to export control regulations administered by the U.S. Department of the Treasury's Office of Foreign Assets Control ("OFAC") and by the Export Administration Regulations administered by the U.S. Department of Commerce's Bureau of Industry and Security ("BIS"). Based on the nature of the product, its ultimate end use and country of destination, we are sometimes subject to foreign assets control and economic sanctions regulations administered by OFAC, which restrict or prohibit our ability to transact with certain foreign countries, certain individuals and entities identified on the Treasury Department's "Denied Parties List." Under the OFAC regulations, the sale or transfer of certain equipment to a location outside the United States may require prior approval in the form of an export license issued by the BIS or the U.S. Department of State's Directorate of Defense Trade Controls. Some potential international transactions may also be restricted or prohibited based on the location, nationality or identity of the potential end user, customer or other parties to the transaction or may require prior authorization in the form of an OFAC license. These risks may be exacerbated by geopolitical tensions in various regions of the world such as China, the Asia-Pacific region and the Middle East. Any delay in obtaining required governmental approvals could affect our ability to conclude a sale or timely commence a project, and the failure to comply with all such controls could result in criminal and/or civil penalties.

Our overall success as a global business depends, in part, upon our ability to succeed in differing economic, social and political conditions. In order to continue to succeed in our international sales strategy, we must continue developing and implementing policies and strategies that are effective in each location where we do business, which could negatively affect our profitability.

Rising inflation and interest rates could negatively impact our revenues, profitability and borrowing costs. In addition, if our costs increase and we are not able to correspondingly adjust our commercial relationships to account for this increase, our net income would be adversely affected, and the adverse impact may be material.

Sustained or increased inflation may result in decreased demand for our products, increased operating costs (including our labor costs), reduced liquidity, and limitations on our ability to access credit or otherwise raise debt and equity capital. In addition, the United States Federal Reserve has raised interest rates in response to concerns about inflation. Increases in interest rates have had, and could continue to have, a material impact on our borrowing costs. In an inflationary environment, we may be unable to raise the sales prices of our products at or above the rate at which our costs increase, which could reduce our profit margins and have a material adverse effect on our financial results and net income. We also may experience lower than expected sales if there is a decrease in spending on products in our industry in general or a negative reaction to our pricing. A reduction in our revenue would be detrimental to our profitability and financial condition and could also have an adverse impact on our future growth.

We have substantial debt, and our lenders have waived our non-compliance with certain of the covenants in our Credit Agreement. If we fail to comply with the terms and conditions of the waiver, or if we fail to comply with any covenants in the future, our lenders may require the amounts outstanding under the debt to become immediately due and payable.

As of December 31, 2024, we had outstanding borrowings of \$37.4 million under the Credit Agreement. We were not in compliance with the consolidated net leverage ratio covenant contained in the Credit Agreement as of the December 31, 2024 test date. Pursuant to the March 2025 Amendment, the lenders and administrative agent agreed to waive such non-compliance subject to the terms contained in the March 2025 Amendment. The March 2025 Amendment provides, among other things, that the lender's commitment under our revolving credit facility is capped at the amount outstanding thereunder as of the date thereof and thus we are unable to make additional borrowings under our revolving credit facility. The March 2025 Amendment also provides that our failure to achieve certain refinancing milestones, including receipt of a term sheet or commitment letter from one or more potential lenders, by the dates provided in the March 2025 Amendment or our failure to consummate a refinancing of the Credit Agreement by June 30, 2025, would, in either case, constitute an event of default under the Credit Agreement. The lenders also agreed not to assert the financial covenants included in the Credit Agreement for the first quarter of fiscal year 2025 provided that we continue to comply with our payment obligations, achieve the refinancing milestones, provide the administrative agent with certain financial reports and maintain a minimum level of liquidity as defined by the March 2025 Amendment. If we are not able to comply with the terms and conditions of the March 2025 Amendment, or if we are otherwise unable to regain and maintain compliance with the covenants under the Credit Agreement, as amended, or are unsuccessful in obtaining waivers or amendments for any covenant in the future, in addition to other actions our lenders may require, the amounts outstanding under the Credit Agreement may become immediately due and payable. See "Part II, Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations - Liquidity and Capital Resources" of this report for additional information regarding the March 2025 Amendment.

If we fail to satisfy these requirements, there can be no assurance that the lenders will not take action to collect payment of our debt or dispose of collateral securing the debt. Our cash flow and existing capital resources may be insufficient to repay our debt, in which such case prior thereto we would have to repay, refinance and or restructure the obligations under the Credit Agreement, including with proceeds from the sale of assets, and additional equity or debt capital. If we are unsuccessful in obtaining such extension, or entering into such repayment, refinance or restructure prior to maturity or acceleration of repayment, our lenders could foreclose against their collateral or seek other remedies, which would jeopardize our ability to continue our current operations.

Our inability to make additional borrowings under our revolving credit facility could materially affect our ability to fund our existing operations or execute our current business strategy. We may be unable to generate sufficient cash flow, and we may be forced to take actions, which may not be successful, to satisfy our obligations and fund our operations.

Due to the consolidated net leverage ratio requirements in the Credit Agreement and based on the terms of the March 2025 Amendment, we are unable to make additional borrowings under our revolving credit facility. Our financial and operating performance will continue to be subject to prevailing economic conditions and to financial, business and other factors, some of which are beyond our control. Depending on our revenues and operating performance, our inability to make such additional borrowings could materially affect our ability to fund our existing operations and maintain our current liquidity position.

Pursuant to the terms of the March 2025 Amendment, we must restructure or refinance the indebtedness underlying the Credit Agreement or seek additional capital to pay such indebtedness. If we are unable to raise sufficient capital on favorable terms and in a timely manner (if at all), our business and product development efforts could be seriously harmed, and we may be restricted in pursuing potential acquisitions or other business development opportunities as we may be forced to reduce or delay investments and capital expenditures. Our ability to restructure or refinance our debt will depend on, among other things, the condition of the credit markets, capital markets and our financial condition at such time. Any refinancing of our debt could be at higher interest rates and may require us to comply with more onerous covenants, which could further restrict our business operations. The terms of existing or future debt instruments may restrict us from adopting some of these alternatives. In addition, any failure to make payments of interest and principal on our outstanding indebtedness on a timely basis would likely result in a reduction of our credit rating, which could harm our ability to incur additional indebtedness. If we raise additional funds through collaborations or licensing arrangements, we may relinquish rights to certain of our technologies or products or grant licenses to third parties on terms that are unfavorable. In the absence of sufficient cash flows and resources, we could face substantial liquidity problems and might be required to dispose of material assets or operations to meet our debt service and other obligations.

The agreement governing our senior secured credit facility contains financial covenants and other covenants that may restrict our current and future operations, particularly our ability to respond to changes in our business or to take certain actions. Any failure to comply with these covenants could materially harm our business, financial condition, results of operations and liquidity.

Pursuant to the terms of the Credit Agreement, we are subject to various covenants, including negative covenants that restrict our ability to engage in certain transactions, which may limit our ability to respond to changing business and economic conditions. Such negative covenants include, among other things, limitations on our ability and the ability of our subsidiaries to incur debt or liens, make investments (including acquisitions), sell assets, and pay dividends on our capital stock. In addition, the Credit Agreement contains certain financial covenants, including a maximum consolidated net leverage ratio and a minimum consolidated fixed charge coverage ratio, each of which is to be tested at the end of each fiscal quarter of the Company. The March 2025 Amendment contains a minimum liquidity requirement, which will be tested on a biweekly basis. The operating and financial restrictions and covenants in the Credit Agreement and any future financing agreements may adversely affect our ability to finance future operations or capital needs or to engage in other business activities.

Our management has identified material weaknesses in our internal controls over financial reporting as of December 31, 2024. Failure to establish and maintain effective internal controls over financial reporting could have a material adverse effect on our ability to report our financial condition, results of operations, or cash flows accurately and on a timely basis.

As a publicly traded company, we are subject to the Sarbanes-Oxley Act of 2002 (“Sarbanes-Oxley Act”). The Sarbanes-Oxley Act requires that we maintain effective disclosure controls and procedures and internal controls over financial reporting. As part of its annual review of the effectiveness of our internal controls over financial reporting as of December 31, 2024, our management identified material weaknesses in our internal control over financial reporting. A material weakness is a deficiency or a combination of deficiencies in internal control over financial reporting such that there is a reasonable possibility that a material misstatement of our annual or interim financial statements will not be prevented or detected on a timely basis. The identified material weaknesses relate to the design and operating effectiveness of our internal controls over (i) our order to cash cycle and (ii) our physical count of inventories. As a result of these material weaknesses, our management also concluded that our disclosure controls and procedures were not effective as of December 31, 2024.

We are currently implementing a plan intended to remediate the material weaknesses described above. The identified material weaknesses will be considered remediated once additional internal controls are designed, implemented and operate effectively for a sufficient period of time to allow management to conclude that the material weaknesses have been fully remediated. However, there can be no assurance that we will be able to remediate fully the material weaknesses on a timely basis. We may also fail to identify other material weaknesses or significant deficiencies that could impair our ability to report our financial condition and results of operations accurately or on a timely basis.

Continued or future failure to maintain effective internal control over financial reporting could result in financial statements that do not accurately reflect our financial condition or results of operations, may result in material misstatements in our financial statements and may also restrict our future access to the capital markets. Further, because of the inherent limitations in any system of controls, even effective internal control over financial reporting could fail to prevent or detect inaccuracies or misstatements.

For a discussion of our internal control over financial reporting and a description of the identified material weaknesses and remediation plans, see “Part II, Item 9A. Controls and Procedures” of this Annual Report on Form 10-K.

Foreign currency exchange rate fluctuations may have a negative impact on our reported earnings.

We are subject to the risks of fluctuating foreign currency exchange rates, which could have an adverse effect on the sales price of our products in foreign markets, as well as the costs and expenses of our foreign subsidiaries. A substantial amount of our revenues is derived from international operations, and we anticipate that a significant portion of revenues will continue to come from outside the United States in the future. As a result, currency fluctuations among the United States dollar, British pound, euro and the other currencies in which we do business have caused and will continue to cause foreign currency translation and transaction gains and losses. We have not used forward exchange contracts to hedge our foreign currency exposures. We attempt to manage foreign currency risk through the matching of assets and liabilities. In the future, we may undertake to manage foreign currency risk through hedging methods, including foreign currency contracts. We recognize foreign currency gains or losses arising from our operations in the period incurred. We cannot guarantee that we will be successful in managing foreign currency risk or in predicting the effects of exchange rate fluctuations upon our future operating results because of the number of currencies involved, the variability of currency exposure and the potential volatility of currency exchange rates. We cannot predict with certainty any changes in foreign currency exchange rates or the degree to which we can address these risks.

Issues in the development, deployment, and use of artificial intelligence technologies in our business operations, services and products may result in reputational harm, regulatory action, or legal liability, and any failure to adapt to such technological developments or industry trends could adversely affect the competitiveness of our business.

Use of artificial intelligence (“AI”) to improve our internal business operations, or in the development or provision of products or services, poses risks and challenges. The use of AI, particularly generative AI, presents opportunities as well as risks that could negatively impact the business. The development, deployment, and use of AI, including within the life sciences industry, is still in its early stages, where the use of insufficiently developed AI technologies and premature deployment practices could result in unintended outcomes that harm the business. AI technologies may be developed using inaccurate, incomplete, flawed or biased algorithms, training methodologies or data, which could result in competitive harm, regulatory penalties, legal liability, or brand or reputational harm. Further, a failure to timely and effectively use or deploy AI and integrate it into new product offerings and services could negatively impact our competitiveness, particularly ahead of evolving industry trends and evolving consumer demands. We may be unable to devote adequate financial resources to develop or acquire new AI technologies and systems in the future.

AI can pose risks from an intellectual property, confidential data leakage, data protection, privacy perspective, as well as raise ethical concerns, compliance issues, and security risks. The input of confidential information or trade secrets into AI systems may result in the loss of intellectual property, proprietary rights, or attorney-client privilege in such information or trade secrets. The use of AI technologies for developing products or services may adversely affect or preclude the company’s intellectual property rights in such products or services, or may expose the company to liability related to the infringement, misappropriation or other violation of third-party intellectual property. The use of AI technologies with personally identifiable information may also result in legal liability. Further, particularly given the nascent stage of the technology, the use of AI can lead to unintended consequences, including the generation of outputs that appear correct but are factually inaccurate, misleading, or that result in unintended biases and discriminatory outcomes, or are otherwise flawed, which could harm our reputation and business and expose us to risks related to such inaccuracies or errors in these outputs.

Moreover, AI is subject to a dynamic and rapidly evolving legal and regulatory environment, which, without appropriate review, governance and risk management, could expose the company to unforeseen legal or regulatory scrutiny and liabilities. As such, it remains uncertain how AI laws and regulations will impact our business or the associated cost or risks related to compliance therewith or with respect to embedding compliance mechanisms appropriately and effectively into our operations. The use of AI may be subject to new legal or regulatory requirements, the impact of which may be prohibitive or pose further risks from a legal or regulatory action perspective.

Failure or inadequacy of our information technology infrastructure or software could adversely affect our day-to-day operations and decision-making processes and have an adverse effect on our performance.

We depend on accurate and timely information and numerical data from key software applications to aid our day-to-day business, financial reporting and decision-making and, in many cases, proprietary and custom-designed software is necessary to operate our business. Disruption caused by the failure of these systems, the underlying equipment, or communication networks could delay or otherwise adversely impact day-to-day business and decision making, could make it impossible for us to operate critical equipment, and could have an adverse effect on our performance. Our disaster recovery plans may not fully mitigate the effect of any such disruption. Disruptions could be caused by a variety of factors, such as catastrophic events or weather, power outages, or cyber-attacks on our systems by outside parties.

Our ERP systems are critical to our ability to accurately maintain books and records, record transactions, provide important information to our management and prepare our financial statements. The implementation of any IT systems, including ERP systems, has required in the past, and may continue to require investment of significant financial and human resources. In addition, we may not be able to successfully complete the implementation of the ERP systems without experiencing difficulties. Any disruptions, delays or deficiencies in the design and implementation of any information technology (“IT”) system, including ERP systems, could adversely affect our ability to process orders, ship products, provide services and customer support, send invoices and track payments, fulfill contractual obligations or otherwise operate our business.

An information security incident, including a cybersecurity breach, could have a negative impact on our business or reputation.

To meet business objectives, we rely on both internal IT systems and networks, and those of third parties and their vendors, to process and store sensitive data, including confidential research, business plans, financial information, intellectual property, and personal data that may be subject to legal protection. The extensive information security and cybersecurity threats, which affect companies globally, pose a risk to the security and availability of these IT systems and networks, and the confidentiality, integrity, and availability of our sensitive data. We continually assess these threats and make investments to increase internal protection, detection, and response capabilities, as well as ensure our third-party providers have the required capabilities and controls to address this risk. We have been, and may continue to be, subject to cybersecurity risks and incidents related to our business. While we have not experienced any material impact to the business or operations resulting from information or cybersecurity incidents, because of the frequently evolving tactics adopted by threat actors, along with the increased volume and sophistication of attacks by such threat actors, there is the potential for us to be materially adversely impacted in the future. This impact could result in reputational, competitive, operational or other business harm as well as financial costs and regulatory action. Additionally, the California Consumer Privacy Act of 2018 (the “CCPA”), which became effective on January 1, 2020, provides private rights of action for data breaches and requires companies that process information on California residents to make new disclosures to consumers about their data collection, use and sharing practices and allow consumers to opt out of certain data sharing with third parties. Compliance with the CCPA and other current and future applicable privacy, cybersecurity and related laws can be costly and time-consuming. Significant capital investments and other expenditures could also be required to remedy cybersecurity problems and prevent future breaches, including costs associated with additional security technologies, personnel, experts and credit monitoring services for those whose data has been breached. These costs, which could be material, could adversely impact our results of operations in the period in which they are incurred and may not meaningfully limit the success of future attempts to breach our information technology systems.

We may be unable to renew leases or enter into new leases on favorable terms or at all.

Our facilities are located in leased premises. When such leases expire, we may be unable to renew such leases or enter into new leases on favorable terms or at all. Further, a significant rise in real estate prices or real property taxes could also result in an increase in lease expenses, and thereby negatively impact the Company’s results of operations and cash flow. As a result, we may incur additional costs including increased rent and other costs related to our renegotiation of lease terms for our facilities or for a new lease in a desirable location.

We may incur additional restructuring costs or not realize the expected benefits of our initiatives to reduce operating expenses in the future.

We may not realize the expected benefits from our recent realignment and restructuring initiatives or similar restructuring initiatives that we may undertake in the future. In addition, we may incur additional restructuring costs in implementing such realignment and restructuring plans or other similar future plans in excess of our expectations. The implementation of our restructuring efforts, including the reduction of our workforce, may not improve our operational and cost structure or result in greater efficiency of our organization; and we may not be able to support sustainable revenue growth and profitability following such restructurings.

If we are not able to manage our growth, our operating profits may be adversely impacted.

Our success will depend on the expansion of our operations through organic growth, and we may execute acquisitions in the future to augment this growth. Effective growth management will place increased demands on our management team, operational and financial resources and expertise. To manage growth, we must optimize our operational, financial and management processes and systems, and information technology infrastructure and hire and train additional qualified personnel. While we continue to evaluate potential improvements to and consolidation of many of our processes and systems, we may not be able to implement these changes in an efficient or timely manner. Failure to manage our growth effectively, including failure to improve our systems and processes timely or efficiently, could impair our ability to generate revenues or could cause our expenses to increase more rapidly than revenues, resulting in operating losses or reduced profitability.

We may incur a variety of costs in connection with acquisitions we may seek to consummate in the future, and we may never realize the anticipated benefits of our acquisitions due in part to difficulties integrating the businesses, operations and product lines.

Our business strategy has historically included the acquisition of businesses, technologies, services or products that we believe are a strategic fit with our business. If we were to undertake future acquisitions, the process of integrating the acquired business, technology, service and/or product(s) may result in unforeseen operating difficulties and expenditures and potentially absorb significant management attention that would otherwise be available for ongoing development of our business. Moreover, we may fail to realize the anticipated benefits of an acquisition as rapidly as expected, or at all. Such transactions are inherently risky, and any such recent or future acquisitions could reduce stockholders' ownership, cause us to incur debt, expose us to future liabilities and result in amortization expenses related to intangible assets with definite lives, which may adversely impact our ability to undertake future acquisitions on substantially similar terms. We may also incur significant expenditures in anticipation of an acquisition that is never realized.

Our ability to achieve the benefits of acquisitions depends in part on the integration and leveraging of technology, operations, sales and marketing channels and personnel. Integration is a complex, time-consuming and expensive process and may disrupt our business if not completed in a timely and efficient manner. We may have difficulty successfully integrating acquired businesses, and their domestic and foreign operations or product lines, and as a result, we may not realize any of the anticipated benefits of the acquisitions we make. We cannot assure that our growth rate will equal the growth rates that have been experienced by us, and these other acquired companies, respectively, operating as separate companies in the past.

If we fail to retain key personnel and hire, train and retain qualified employees, we may not be able to compete effectively, which could result in reduced revenue or increased costs.

Our success is highly dependent on the continued services of key management, technical and scientific personnel. Our management and other employees may voluntarily terminate their employment at any time upon short notice. The loss of the services of any member of the senior management team, including the Chief Executive Officer or Chief Financial Officer or any of our managerial, technical or scientific staff, may significantly delay or prevent the achievement of product development, our growth strategies and other business objectives. Our future success will also depend on our ability to identify, recruit and retain additional qualified scientific, technical and managerial personnel. We operate in several geographic locations where labor markets are particularly competitive, including the Boston, Massachusetts and Minneapolis, Minnesota metropolitan areas, England, and Germany where demand for personnel with these skills is extremely high and is likely to remain high. As a result, competition for qualified personnel is intense, particularly in the areas of general management, finance, information technology, engineering and science, and the process of hiring suitably qualified personnel is often lengthy and expensive and may become more expensive in the future. If we are unable to hire and retain a sufficient number of qualified employees, our ability to conduct and expand our business could be seriously reduced.

Our success will depend partly on our ability to operate without infringing on or misappropriating the intellectual property rights of others.

We may be sued for infringing on the intellectual property rights of others, including the patent rights, trademarks and trade names of third parties. Intellectual property litigation is costly, and the outcome is uncertain. If we do not prevail in any intellectual property litigation, in addition to any damages we might have to pay, we could be required to stop the infringing activity or obtain a license to or design around the intellectual property in question. If we are unable to obtain a required license on acceptable terms, or are unable to design around any third-party patent, we may be unable to sell some of our products and services, which could result in reduced revenue.

Third parties may seek to hold us responsible for Harvard Apparatus Regenerative Technologies, Inc.'s ("HRGN") (formerly known as Biostage, Inc.) liabilities, including liabilities that HRGN has assumed from us.

Third parties may continue to seek to hold us responsible for HRGN's liabilities, including any of the liabilities that HRGN agreed to retain or assume in connection with the separation of the HRGN business from our businesses, and related spin-off distribution. For example, in April 2022, we and HRGN entered into a settlement of a litigation relating to injuries allegedly caused by products produced by us and HRGN and utilized in connection with surgeries performed by third parties (the "HRGN Settlement"). The HRGN Settlement resolved and dismissed all claims by and between the parties.

Risks Related to Our Common Stock

Our stock price has fluctuated in the past and could experience substantial additional declines in the future.

The market price of our common stock has experienced significant fluctuations and may become volatile and could decline further in the future, perhaps substantially, in response to various factors including, but not limited to:

- the substantial doubt with regard to our ability to continue as a going concern;
- our business performance;
- volatility of the financial markets;
- uncertainty regarding the prospects of the domestic and foreign economies; and
- technological innovations by competitors or in competing technologies.

In addition, public stock markets have experienced extreme price and trading volatility. The stock market and the Nasdaq Global Market in general, and the biotechnology and life science tools industry and small cap markets in particular, have experienced significant price and volume fluctuations that at times may have been unrelated or disproportionate to the operating performance of those companies. These broad market and industry factors may further harm the market price of our common stock, regardless of our operating performance. In the past, securities class action litigation has often been instituted following periods of volatility in the market price of a company's securities. A securities class action suit against us could result in substantial costs, potential liabilities and the diversion of management's attention and resources.

If we raise additional funds through the sale of equity or convertible debt or other equity-linked securities, investors may experience significant dilution of their ownership interest.

We may raise additional funds through the sale of equity or convertible debt or other equity-linked securities to repay our existing indebtedness, implement our acquisition strategy, expand our operations or invest in the development of new products. If we raise additional funds through such sales, investors may experience significant dilution of their ownership interest. We may issue securities that have rights, preferences and privileges senior to our common stock. If we raise additional funds by obtaining loans from third parties, the terms of those financing arrangements may include negative covenants or other restrictions on our business that could impair our operational flexibility and would also require us to incur additional interest expense.

General Risks

We are currently operating in a period of economic uncertainty and capital markets disruption, which has been significantly impacted by geopolitical instability due to military conflicts. Our business, financial condition and results of operations may be materially adversely affected by any negative impact on the global economy and capital markets resulting from the conflict in Ukraine, the Middle East or any other geopolitical tensions.

U.S. and global markets are experiencing volatility and disruption following the escalation of geopolitical tensions globally, including military conflicts (such as the conflict between Russia and Ukraine and the conflicts in Israel and the Middle East). Although the length and impact of these conflicts are highly unpredictable, these conflicts could lead to market disruptions, including significant volatility in commodity prices, credit and capital markets, supply chain interruptions, and additional economic and financial sanctions.

Any of the abovementioned factors could affect our business, prospects, financial condition, and operating results. The extent and duration of the military action, sanctions and resulting market disruptions are impossible to predict, but could be substantial. Any such disruptions may also magnify the impact of other risks described in this Annual Report on Form 10-K.

Epidemics and pandemics have had, and in the future may have, a material adverse impact on our business.

Our operations and financial performance have been, and in the future may be, negatively impacted by public health crises, epidemics and pandemics. Such events have caused, and may in the future cause, impacts such as reductions in economic activity (including volatility in demand for our products, services, and solutions, disruptions in global supply chains, and volatility in financial markets). Additionally, we have in the past experienced, and may in the future experience, operational challenges such as workplace disruptions, restrictions on the movement of people, raw materials, and goods (both at our own facilities and at those of our customers and suppliers), global supply chain disruptions, delays or disruptions in orders and order fulfillment, and price inflation.

If we incur higher costs as a result of trade policies, treaties, government regulations or tariffs, we may become less profitable.

There continues to be uncertainty about the relationship between the United States and foreign countries, including with respect to trade policies, treaties, government regulations and tariffs. The United States has recently instituted or proposed changes in trade policies that include the negotiation or termination of trade agreements, the imposition of higher tariffs on imports into the United States, economic sanctions on individuals, corporations or countries, and other government regulations affecting trade between the United States and other countries where we conduct our business. A number of other nations have proposed or instituted similar measures directed at trade with the United States in response. As a result of these developments, there may be greater restrictions and economic disincentives on international trade that could materially and adversely affect our business.

We may be the subject of lawsuits from counterparties to acquisitions and divestitures, including an acquiring company or its stockholders, an acquired company's previous stockholders, a divested company's stockholders or our current stockholders.

We may be the subject of lawsuits from either an acquiring company or its stockholders, an acquired company's previous stockholders, a divested company's stockholders or our current stockholders. Such lawsuits could result from the actions of the acquisition or divestiture target prior to the date of the acquisition or divestiture, from the acquisition or divestiture transaction itself or from actions after the acquisition or divestiture. Defending potential lawsuits could cost us significant expense and detract management's attention from the operation of the business. Additionally, these lawsuits could result in the cancellation of or the inability to renew certain insurance coverage that would be necessary to protect our assets

Rising commodity and precious metals costs could adversely impact our profitability.

Raw material commodities, such as resins, and precious metal commodities, such as platinum, are subject to wide price variations. Increases in the costs of these commodities and the costs of energy, transportation and other necessary services may adversely affect our profit margins if we are unable to pass along any higher costs in the form of price increases or otherwise achieve cost efficiencies such as in manufacturing and distribution.

Provisions of Delaware law, or of our charter and bylaws may make a takeover more difficult, which could cause our stock price to decline.

Provisions in our certificate of incorporation and bylaws and in the Delaware corporate law may make it difficult and expensive for a third party to pursue a tender offer, change in control or takeover attempt, which is opposed by management and the board of directors. Public stockholders who might desire to participate in such a transaction may not have an opportunity to do so. We have a staggered board of directors that makes it difficult for stockholders to change the composition of the board of directors in any one year. These anti-takeover provisions could substantially impede the ability of public stockholders to change our management and board of directors. Such provisions may also limit the price that investors might be willing to pay for shares of our common stock in the future.

Item 1B. *Unresolved Staff Comments.*

None.

Item 1C. *Cybersecurity.*

Cybersecurity Risk Management and Strategy

We have implemented a cybersecurity risk management program intended to protect the confidentiality, integrity, and availability of our critical systems and information. Our cybersecurity risk management program is an element of and is integrated into our overall enterprise risk management program. Our framework is informed in part by the National Institute of Standards and Technology (NIST) Cybersecurity Framework and International Organization for Standardization 27001 (ISO 27001) Framework, although we have not been audited to, and may not be in compliance with, all technical standards, specifications or requirements under the NIST or ISO 27001 frameworks. Our cybersecurity risk management program includes:

- risk assessments designed to help identify material cybersecurity risks to our critical systems, information, products and services, and our broader enterprise IT environment;
- a security team that is principally responsible for managing (1) our cybersecurity risk assessment processes, (2) our security controls, and (3) our response to cybersecurity incidents;
- the use of external service providers, where appropriate, to assess, test, or otherwise assist with aspects of our security controls;
- cybersecurity awareness training for our employees, incident response personnel, and senior management;
- assessment of material cybersecurity risks posed by third-party service providers, including risks to employee, customer and financial information; and
- a cybersecurity incident response protocol that includes procedures for responding to cybersecurity incidents.

We have been, and expect to continue to be, subject to cybersecurity risks and incidents related to our business. To date, such risks and incidents have not materially affected our business strategy, results of operations or financial condition. For more information about the cybersecurity risks we face, see Item 1A – Risk Factors.

Cybersecurity Governance

Our Board considers cybersecurity risk as part of its enterprise risk management oversight function. This oversight includes periodic reports from management, including our Vice President of IT, concerning cybersecurity related risks.

Our management team, including our Vice President of IT, is responsible for assessing and managing risks from cybersecurity threats. Our Vice President of IT has extensive information technology and program management experience, including broad experience in corporate and consulting environments across a range of organizations and industries. Where appropriate, she engages external cybersecurity consultants to assist with cybersecurity related matters. Our management team has primary responsibility for our overall cybersecurity risk management program and, under the leadership of our Vice President of IT, supervises both our internal personnel and external cybersecurity consultants. Our program includes efforts to prevent, detect, mitigate, and remediate cybersecurity risks. These efforts employ information from various sources, such as security tools deployed in our IT environment, internal personnel, external security consultants, and governmental sources.

Item 2. *Properties.*

Our facilities incorporate manufacturing, research and development, sales and marketing, and administration functions. As of December 31, 2024, we leased the following principal facilities:

Location	Description of Facility	Approximate Square Footage	Expiration
New Brighton, Minnesota	Manufacturing facility	75,000	2030
Holliston, Massachusetts	Manufacturing facility and corporate headquarters	52,000	2029
Reutlingen, Germany	Manufacturing facility	23,000	2025*
Barcelona, Spain	Manufacturing facility	16,000	2025+
March-Hugstetten, Germany	Manufacturing facility	11,000	2025

* After December 31, 2024, this lease was extended through January 2030.

+ This lease is renewed on a month-to-month basis.

We also lease facilities in Cambridge, England; Kista, Sweden; Beijing, China; and Shanghai, China. We believe our current facilities are adequate for our needs for the foreseeable future.

Item 3. *Legal Proceedings.*

For information related to legal proceedings, see the discussion in Note 16 to the Consolidated Financial Statements included in “Part IV, Item 15. Exhibits, Financial Statement Schedules” of this report, which information is incorporated by reference into this Item 3.

Item 4. *Mine Safety Disclosures*

Not Applicable.

PART II**Item 5. *Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities*****Market Information**

Our common stock is quoted on the Nasdaq Global Market under the symbol “HBIO.”

Stockholders

There were 86 holders of record of our common stock as of March 5, 2025. The number of record holders was determined from the records of our transfer agent and does not include beneficial owners of our common stock whose shares are held in the names of various security brokers, dealers, and registered clearing agencies.

Dividend Policy

We have never declared or paid cash dividends on our common stock in the past and do not intend to pay cash dividends on our common stock in the foreseeable future. Any future determination to pay cash dividends will be at the discretion of our board of directors and will depend on our financial condition, results of operations, capital requirements and other factors our board of directors deems relevant.

Item 6. *[Reserved]*

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

Forward-Looking Statements

The following section of this Annual Report on Form 10-K contains statements that are not statements of historical fact and are forward-looking statements within the meaning of federal securities laws. These statements involve known and unknown risks, uncertainties and other factors that may cause our actual results, financial performance or achievements to be materially different from any future results, financial performance or achievements expressed or implied by the 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. Factors that may cause our actual results to differ materially from those in the forward-looking statements include those factors described in "Item 1A. Risk Factors" in this Annual Report on Form 10-K. You should carefully review all of these factors, as well as the comprehensive discussion of forward-looking statements on page 1 of this Annual Report on Form 10-K.

Overview

Harvard Bioscience is a leading developer, manufacturer and seller of technologies, products and services that enable fundamental advances in life science applications, including research, pharmaceutical and therapy discovery, bioproduction and preclinical testing for pharmaceutical and therapy development. Our products and services are sold globally to customers ranging from renowned academic institutions and government laboratories to the world's leading pharmaceutical, biotechnology and CROs. With operations in the United States, Europe and China, we sell through a combination of direct and distribution channels to customers around the world.

Restructuring Activities

During the year ended December 31, 2023, the Company initiated a restructuring and incurred \$0.4 million in inventory charges, severance and other expenses related to the restructuring program. During the year ended December 31, 2024, the Company continued and completed additional restructurings and incurred expenses of \$0.8 million, primarily consisting of severance recorded in connection with headcount reductions in Europe and North America.

Selected Results of Operations

In the table below, we provide an overview of selected operating metrics for the year ended December 31, 2024, compared to the year ended December 31, 2023.

	Year Ended December 31,			
	2024	% of revenue	2023	% of revenue
(dollars in thousands)				
Revenues	\$ 94,135		\$ 112,250	
Gross profit	54,766	58.2%	66,071	58.9%
Sales and marketing expenses	22,212	23.6%	24,060	21.4%
General and administrative expenses	21,493	22.8%	22,757	20.3%
Research and development expenses	10,406	11.1%	11,764	10.5%
Amortization of intangible assets	5,255	5.6%	5,525	4.9%
Other operating expenses	1,611	1.7%	71	0.1%
Interest expense	3,209	3.4%	3,591	3.2%
Loss on equity securities	1,593	1.7%	632	0.6%
Income tax expense	740	0.8%	859	0.8%

Revenues

Revenues decreased \$18.2 million, or 16.1%, to \$94.1 million for the year ended December 31, 2024, compared to \$112.3 million for the year ended December 31, 2023. The decrease in revenues was primarily due to softening of worldwide demand from distributors, CRO's and academic medical research institutions. Changes in foreign currency exchange rates had a \$0.2 million favorable effect on revenues during the year ended December 31, 2024.

Gross profit

Gross profit decreased \$11.3 million, or 17.1%, to \$54.8 million for the year ended December 31, 2024, compared with \$66.1 million for the year ended December 31, 2023, primarily due to the decreases in revenues. Gross margin decreased to 58.2% for the year ended December 31, 2024, compared with 58.9% for the year ended December 31, 2023. Gross margin was unfavorably impacted by the under-absorption of fixed manufacturing overhead costs due to the decrease in revenues which was partially offset by a better mix of high margin products and lower labor costs.

Sales and marketing expenses

Sales and marketing expenses decreased \$1.9 million, or 7.7%, to \$22.2 million for the year ended December 31, 2024, compared to \$24.1 million for the year ended December 31, 2023. The decrease was primarily due to a decrease in compensation costs of \$1.3 million, a decrease in consulting costs of \$0.2 million and a decrease in travel costs of \$0.2 million, in each case as compared to the year ended December 31, 2023.

General and administrative expenses

General and administrative expenses decreased by \$1.3 million, or 5.6%, to \$21.5 million for the year ended December 31, 2024, compared with \$22.8 million for the year ended December 31, 2023. The decrease was primarily due to a decrease in compensation costs of \$1.3 million, a decrease of \$0.5 million due to the capitalization of labor and consulting expenses associated with our U.S. ERP consolidation project and a decrease in travel and entertainment costs of \$0.2 million, partially offset by an increase in professional fees of \$0.4 million and an increase in depreciation expense of \$0.2 million, in each case as compared to the year ended December 31, 2023.

Research and development expenses

Research and development expenses decreased \$1.4 million, or 11.5%, to \$10.4 million for the year ended December 31, 2024, compared with \$11.8 million for the year ended December 31, 2023. The decrease was primarily due to a decrease in compensation costs of \$0.9 million and a decrease of \$0.3 million due the capitalization of software development costs, as compared to the year ended December 31, 2023.

Amortization of intangible assets

Amortization of intangible assets decreased \$0.2 million, or 4.9%, to \$5.3 million for the year ended December 31, 2024, compared with \$5.5 million for the year ended December 31, 2023.

Other operating expenses

Other operating expenses for the year ended December 31, 2024, were \$1.6 million and included restructuring costs of \$0.8 million in connection with headcount reductions, a fee of \$0.5 million in connection with the receipt of employee retention tax credits, and \$0.3 million related to settlement of an unclaimed property audit. Other operating expenses for the year ended December 31, 2023, were \$0.1 million and included restructuring costs in connection with headcount reductions.

Interest expense

Interest expense decreased \$0.4 million, or 10.6%, to \$3.2 million for the year ended December 31, 2024, compared with \$3.6 million for the year ended December 31, 2023. The decrease was primarily due to lower average borrowings during the period.

Loss on equity securities

As of December 31, 2023, we held shares of common stock of HRGN with an estimated fair value of \$3.5 million. These shares were received in connection with the settlement of indemnification obligations related to litigation which was resolved during the year ended December 31, 2022. During the year ended December 31, 2024, we sold all of our HRGN shares for \$1.9 million and recorded a loss on sale of \$1.6 million. During the year ended December 31, 2023, we recorded unrealized losses of \$0.6 million related to these shares.

Income tax expense

Income tax expense for the year ended December 31, 2024, was \$0.7 million compared to \$0.9 million for the year ended December 31, 2023. The effective tax rates for the years ended December 31, 2024 and 2023, were (6.3)% and (33.5)%, respectively. The lower effective tax rate during the year ended December 31, 2024, compared to the year ended December 31, 2023, was primarily related to changes to tax attribute carryforwards, a decrease in the Company's Global Intangible Low-Taxed Income ("GILTI") inclusion, and a difference in the company's excess tax benefits related to stock compensation. Our effective tax rate for the year ended December 31, 2024, was different than the U.S. statutory rate primarily due to changes in valuation allowances associated with our assessment of the likelihood of the recoverability of deferred tax assets and the impact of changes to prior year tax accruals. Our effective tax rate for the year ended December 31, 2023, was different than the U.S. statutory rate primarily due to the mix of forecasted income or losses in the U.S. and foreign tax jurisdictions, a GILTI inclusion to taxable income and the impact of changes to tax attribute carryforwards.

Liquidity and Capital Resources

Our primary sources of liquidity are cash and cash equivalents, internally generated cash flow from operations and our shelf registration statement that provides for the issuance of common stock, preferred stock, warrants and units up to an amount equal to \$100 million (the “2024 Shelf Registration Statement”). Our expected cash outlays relate primarily to cash payments due under our Credit Agreement described below as well as salaries, inventory, and capital expenditures. We held cash and cash equivalents of \$4.1 million and \$4.3 million as of December 31, 2024 and December 31, 2023, respectively. Borrowings outstanding were \$37.4 million and \$37.1 million as of December 31, 2024 and December 31, 2023, respectively.

The Coronavirus Aid, Relief, and Economic Security Act of 2020 (“CARES Act”) provided an employee retention tax credit (“ERTC”) that was a refundable tax credit against certain employer taxes. The Company received ERTC refunds of \$3.2 million during the year ended December 31, 2024. In January 2025, the Company received an additional \$1.0 million of ERTC refunds. The Company’s compliance with the program’s qualifications may be subject to audit until May 2028, which is when the statute of limitation expires.

We maintain a Credit Agreement that provides for a term loan of \$40.0 million and a \$25.0 million revolving credit facility both maturing on December 22, 2025. On March 28, 2024, we entered into an amendment to the Credit Agreement pursuant to which the Lenders and administrative agent modified the definition of Consolidated EBITDA used in the calculation of certain financial covenants to adjust for charges related to an abandoned property audit and commission fees in connection with our employee retention tax credit filings. On August 6, 2024, we entered into an amendment to the Credit Agreement that, among other things, modified the financial covenants relating to the consolidated net leverage ratio and consolidated fixed charge coverage ratio through the period ended December 31, 2024. The amendment also added a net leverage ratio requirement with respect to additional borrowing under our revolving credit facility and restrictions on certain additional indebtedness and investments. In addition, the applicable interest rate margin was increased by 50bps during such time as the consolidated net leverage ratio is greater than 3.0. We paid fees of \$0.2 million to the Lenders in connection with the August 6th amendment.

We were not in compliance with the consolidated net leverage ratio covenant contained in the Credit Agreement as of the December 31, 2024 test date. On March 10, 2025, we entered into an amendment to the Credit Agreement (the “March 2025 Amendment”) pursuant to which the lenders and administrative agent agreed to waive such non-compliance, subject to the terms contained in the March 2025 Amendment. The March 2025 Amendment provides, among other things, that the lender’s commitment under our revolving credit facility is capped at the amount outstanding thereunder as of the date thereof and thus we are unable to make additional borrowings under our revolving credit facility. The March 2025 Amendment also establishes certain milestones with respect to the refinancing of the debt underlying the Credit Agreement (the “Refinancing”) and dates by which such milestones must be met. These milestones include: (1) continuing to retain an investment banker for the purpose of assisting with the consummation of the Refinancing; (2) by March 14, 2025, the engagement of a financial advisor acceptable to the administrative agent; (3) by April 30, 2025, the delivery to the administrative agent of an executed bona fide indication of interest from one or more potential lenders with respect to the Refinancing on terms and conditions acceptable to the administrative agent; (4) by May 23, 2025, the delivery to the administrative agent of a term sheet or commitment letter from one or more potential lenders that provides for the Refinancing on terms and conditions acceptable to the administrative agent; (5) by June 13, 2025, delivery to the administrative agent of: (i) a statement of sources and uses of transaction proceeds; and (ii) evidence that the potential lender’s conditions to closing (other than customary closing deliveries) of the Refinancing, such as business commitments, are satisfied; and (6) by June 30, 2025, the closing of the Refinancing. The lenders also agreed not to assert the financial covenants included in the Credit Agreement for the first quarter of fiscal year 2025 provided that we continue to comply with our payment obligations, achieve the refinancing milestones, maintain minimum liquidity (defined as the sum of (a) unrestricted cash and cash equivalents and (b) the amount by which the aggregate amount committed under the Company’s revolving credit facility exceeds the total amount drawn under the credit facility) of \$3.5 million and provide the administrative agent with certain financial reports. In addition, pursuant to the terms of the March 2025 Amendment the applicable interest rate margin is increased such that interest rate is equal to a rate per annum based on the Secured Overnight Financing Rate (“SOFR”) plus 400 bps and amortization payments were revised so that a proportionate payment must be made on a monthly rather than a quarterly basis.

If we are not able to comply with the terms and conditions of the March 2025 Amendment, or if we are otherwise unable to regain and maintain compliance with the covenants under the Credit Agreement, as amended, or are unsuccessful in obtaining waivers or amendments for any covenant in the future, in addition to other actions our lenders may require, the amounts outstanding under the Credit Agreement may become immediately due and payable. We paid fees of \$0.1 million to the Lenders in connection with the March 2025 Amendment.

We continue to take actions intended to improve liquidity, including actions related to cost containment and inventory reduction. Based on its current operating plans, the Company expects that its available cash and cash generated from operations will be sufficient to finance operations and capital expenditures while the Company works to refinance the Credit Agreement.

Condensed Consolidated Cash Flow Statements

(in thousands)	Year Ended December 31,	
	2024	2023
Cash provided by operating activities	\$ 1,440	\$ 14,028
Cash used in investing activities	(1,344)	(1,799)
Cash used in financing activities	(131)	(12,134)
Effect of exchange rate changes on cash	(140)	(320)
Decrease in cash and cash equivalents	\$ (175)	\$ (225)

Cash provided by operations was \$1.4 million and \$14.0 million for the years ended December 31, 2024 and 2023, respectively. Cash flow from operations for the year ended December 31, 2024 was negatively impacted by \$8.1 million as a result of a larger net loss for the period adjusted for non-cash items, along with a \$7.7 million decrease due to changes in operating assets and liabilities, which was offset by the receipt of \$3.2 million of employee retention tax credits.

Cash used in investing activities was \$1.3 million for the year ended December 31, 2024, and consisted of \$3.2 million of capital expenditures for manufacturing and information technology infrastructure and software development, offset by \$1.9 million in proceeds from the sale of marketable equity securities. Cash used in investing activities was \$1.8 million for the year ended December 31, 2023, and primarily consisted of \$2.3 million of capital expenditures in manufacturing, information technology infrastructure, and capitalized software costs, offset by \$0.5 million from proceeds from the sale of our Hoefer product line.

Cash used by financing activities was \$0.1 million for the year ended December 31, 2024. During this period, debt outstanding under our credit facility increased by \$0.2 million, due to net borrowings under our revolver of \$6.2 million and payments of \$6.0 million against the term loan. Additionally, we paid debt issuance costs of \$0.2 million. We also received proceeds of \$0.4 million from the exercise of stock options and employee stock purchase plan purchases and paid \$0.6 million for taxes related to net share settlement of equity awards.

Cash used in financing activities was \$12.1 million for the year ended December 31, 2023. During this period, we made term loan installments payments under the Credit Agreement of \$4.1 million, with net payments of \$6.4 million under the revolving credit facility. We also received proceeds of \$0.9 million from the exercise of stock options and the employee stock purchase plan and paid \$2.5 million for taxes related to net share settlement of equity awards.

Impact of Foreign Currencies

Our international operations in some instances operate as 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, primarily the euro and the British pound. During the year ended December 31, 2024, changes in foreign currency exchange rates resulted in a favorable effect on revenues of \$0.2 million and an unfavorable effect on expenses of \$0.3 million.

During the years ended December 31, 2024 and 2023, the translation of foreign currency into U.S. dollars included as a component of comprehensive loss resulted in a (loss) gain of \$(1.4) million and \$1.5 million, respectively. In addition, the currency exchange rate fluctuations included as a component of net loss resulted in currency losses of \$(0.2) million during both years ended December 31, 2024 and 2023.

Going Concern and Management Plans

As of December 31, 2024, there was indebtedness of \$37.4 million outstanding under our term loan and senior revolving credit facility (collectively, the "Credit Agreement"). We were not in compliance with the consolidated net leverage ratio covenant contained in the Credit Agreement as of the December 31, 2024 test date. On March 10, 2025, we entered into an amendment to the Credit Agreement (the "March 2025 Amendment") pursuant to which the lenders and administrative agent agreed to waive such non-compliance, subject to the terms contained in the March 2025 Amendment. The March 2025 Amendment provides, among other things, that our failure to achieve certain refinancing milestones, including receipt of a term sheet or commitment letter from one or more potential lenders, by the dates provided in the March 2025 Amendment or our failure to consummate a refinancing of the Credit Agreement by June 30, 2025, would, in either case, constitute an event of default under the Credit Agreement. In such event, in addition to other actions our lenders may require, the amounts outstanding under the Credit Agreement may become immediately due and payable.

We are exploring alternative sources of capital that would allow us to refinance our outstanding indebtedness by June 30, 2025, in order to avoid default under the Credit Agreement, but our ability to access such other sources of capital is uncertain. There is no assurance that such capital will be available to us, be obtainable on commercially acceptable terms, or provide us with sufficient funds to meet our objectives. Based on our anticipated cash flows from operations, unless we are able to access other sources of capital or extend the date for repayment under the Credit Agreement, we will be unable to pay our debt obligations and fund our operations for at least twelve months from the date of issuance of the consolidated financial statements contained in this Annual Report on Form 10-K. As a result, there is substantial doubt about our ability to continue as a going concern.

As discussed in Note 2 to the Consolidated Financial Statements included in “Part IV, Item 15. Exhibits, Financial Statement Schedules” of this report, our consolidated financial statements include an explanatory paragraph that such financial statements were prepared assuming that we will continue as a going concern, continue our operations for the foreseeable future and realize assets and settle liabilities in the normal course of business. The financial statements do not give effect to any adjustments to the amounts and classification of assets and liabilities that may be necessary should we be unable to continue as a going concern. Such adjustments could be material.

Recent Accounting Pronouncements

For information on recent accounting pronouncements impacting our business, see “Recent Accounting Pronouncements” included in Note 2 to the Consolidated Financial Statements included in “Part IV, Item 15. Exhibits, Financial Statement Schedules” of this report.

Critical Accounting Policies and Estimates

The discussion and analysis of our financial condition and results of operations are based upon our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenue and expenses, and related disclosure of contingent assets and liabilities. On an ongoing basis, we evaluate our estimates, including those related to revenue recognition, income taxes, litigation and other contingencies. We base our estimates on historical experience and on various other assumptions that are believed to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

We believe the following is one of the more significant judgments and estimates used in the preparation of our consolidated financial statements:

Impairment of Goodwill and Other Long-Lived Assets

Goodwill is tested for impairment annually or more frequently if events or changes in circumstances indicate that the asset might be impaired. The impairment analysis for goodwill consists of an qualitative assessment potentially followed by a quantitative analysis. If we determine that the carrying value of our reporting unit exceeds its fair value, an impairment charge to goodwill is recorded for the excess. The critical judgments involved in our annual qualitative test of goodwill include an assessment of unfavorable events and a judgment of whether those events put our goodwill at risk of impairment, which if determined to be at risk would require us to perform a quantitative test. The critical judgments and estimates in our quantitative tests for goodwill and long-lived assets include selection and weighting of available valuation methods and the selection of assumptions that may be used in those methods.

During the year ended December 31, 2024, we determined that indicators of impairment were present for our goodwill and certain assets included in a long-lived asset group, including liquidity risk associated with inability to borrow under our Credit Agreement and reduced operating profits. Based on the quantitative analysis, we concluded that our goodwill and certain assets included in a long-lived asset group were not impaired due to the excess of fair value over the carrying value of these assets at December 31, 2024. Based on declines in our stock price subsequent to December 31, 2024, the carrying value of our stockholders’ equity currently exceeds its fair value, which could lead to future impairment.

Income Taxes and Valuation Allowance

We are subject to income taxes in the U.S. and numerous foreign jurisdictions. Our annual tax rate is based on income, statutory tax rates, tax reserve changes and tax planning opportunities available to us in the various jurisdictions in which we operate. We regularly assess the likelihood of tax adjustments in each of the tax jurisdictions in which we have operations and account for the related financial statement implications. We have established tax reserves that we believe are appropriate given the possibility of tax adjustments. Determining the appropriate level of tax reserves requires significant judgment regarding the uncertain application of tax laws. Reserves are adjusted when information becomes available or when an event occurs indicating a change in the reserve is appropriate. Changes in tax reserves could have a material impact on our financial condition or results of operations.

Significant judgment is also required in determining the amount of deferred tax assets that will ultimately be realized and any corresponding deferred tax asset valuation allowance. When estimating the necessary valuation allowance, we consider all available evidence for each jurisdiction including historical operating results, estimates of future taxable income and the feasibility of ongoing tax planning strategies. If new information becomes available that would alter our estimate of the amount of deferred tax assets that will ultimately be realized, we adjust the valuation allowance through income tax expense. Changes in the deferred tax asset valuation allowance could have a material impact on our financial condition or results of operations.

Item 7A. *Quantitative and Qualitative Disclosures about Market Risk.*

Not Applicable.

Item 8. *Financial Statements and Supplementary Data.*

The information required by this item is contained in the financial statements referenced in “Part IV, Item 15. Exhibits, Financial Statement Schedules” of this report, which financial statements are appended to this report. An index of those financial statements is found on page F-1.

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

None.

Item 9A. *Controls and Procedures.*

This Report includes the certifications of our Chief Executive Officer and Chief Financial Officer required by Rule 13a-14 of the Securities Exchange Act of 1934, as amended (the “Exchange Act”). See Exhibits 31.1 and 31.2. This Item 9A includes information concerning the controls and control evaluations referred to in those certifications.

(a) *Evaluation of Disclosure Controls and Procedures*

Disclosure controls and procedures refer to controls and other procedures designed to ensure that information required to be disclosed in the reports we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the rules and forms of the U.S. Securities and Exchange Commission. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by us in our reports that we file or submit under the Exchange Act is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, as appropriate to allow timely decisions regarding our required disclosure. In designing and evaluating our disclosure controls and procedures, our management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives, and management was required to apply its judgment in evaluating and implementing possible controls and procedures.

We carried out an evaluation, under the supervision and with the participation of our Chief Executive Officer and Chief Financial Officer, of the effectiveness of the design and operation of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act) as of the end of the period covered in this Report. Based upon the evaluation described above, our Chief Executive Officer and Chief Financial Officer have concluded as a result of the material weaknesses described below that they believe that our disclosure controls and procedures were not effective, as of December 31, 2024, 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 Chief Financial Officer, to allow timely decisions regarding required disclosures, and is recorded, processed, summarized and reported within the time periods specified in the Securities and Exchange Commission’s rules and forms.

(b) Management's Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act). Our internal control over financial reporting is a process designed by and under the supervision of our Chief Executive Officer and Chief Financial Officer and effected by our management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of consolidated financial statements for external purposes in accordance with generally accepted accounting principles. Our internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect transactions and dispositions of assets, (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of consolidated financial statements for external purposes in accordance with generally accepted accounting principles, (3) provide reasonable assurance that receipts and expenditures are being made only in accordance with authorizations of management and directors, and (4) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of assets that could have a material effect on the consolidated financial statements.

Because of inherent limitations, internal control over financial reporting may not prevent or detect misstatements. It is a process that involves human diligence and compliance and is therefore subject to human error and misjudgment. In general, evaluations of effectiveness for future periods are subject to risk as controls may become inadequate due to changes in conditions or the degree of compliance with key processes or procedures could deteriorate.

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rule 13a-15(f). Under the supervision and with the participation of our management, including our Chief Executive Officer and Chief Financial Officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting as of December 31, 2024, based on the framework in Internal Control — Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on our evaluation under the framework in Internal Control — Integrated Framework, management concluded that our internal control over financial reporting was not effective, as of December 31, 2024, as a result of the material weaknesses described below.

Material Weaknesses

A material weakness is a deficiency or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of our annual or interim financial statements will not be prevented or detected on a timely basis.

Based on management's assessment of our internal control over financial reporting, management determined that we did not design and maintain effective controls over (i) our order to cash cycle and (ii) our physical count of inventories. Specifically, we did not design and maintain effective manual controls over the processing and review of a substantial portion of our revenue transactions. Additionally, we did not design and maintain an effective cycle count program to verify quantities of inventories held at Company locations that account for a substantial portion of inventories. The timeliness, level of precision, and appropriate segregation of duties in our review processes over revenue transactions and our physical counts of inventories were not sufficient to prevent, detect, and correct potential misstatements in a timely manner. These material weaknesses did not result in any identified material misstatement in any of our previously filed interim or annual financial statements.

Because of these material weaknesses, management concluded that the Company did not maintain effective internal controls over financial reporting as of December 31, 2024.

The effectiveness of our internal control over financial reporting as of December 31, 2024 has also been audited by Grant Thornton LLP, our independent registered public accounting firm, as stated in their report, which is included below in Item 9A(e).

In response to the material weaknesses, we implemented, and are continuing to implement, measures designed to improve our internal control over financial reporting. These efforts include:

- Redesigning and maintaining effective controls over the completeness and accuracy of inputs that are used in the order to cash cycle;
- Assessing the precision and frequency of the performance of the identified controls;
- Retraining staff involved in the process to ensure controls are adequately performed on a timely basis;
- Strengthening, formalizing, documenting and testing accounting processes and internal controls in the order to cash cycle and identify system controls that could supplement the manual reviews; and
- Strengthening the effectiveness of our cycle count program and controls while providing training on standard operating procedures and internal controls to employees responsible for the supply chain, logistics and inventory processes.

The material weaknesses will not be considered remediated until management completes the design and implementation of the measures described above and the controls operate for a sufficient period of time such that the effectiveness of those changes is demonstrated with an appropriate amount of consistency and management has concluded, through testing, that these controls are effective. We also may conclude that additional measures may be required to remediate the material weaknesses or determine to modify the remediation plans described above. Management believes that the remediation measures described above will be implemented in a manner such that the controls can be tested, and the identified material weaknesses can be determined to be remediated, however, no assurance can be made that such remediation will occur or that additional material weaknesses will not be identified.

Grant Thornton LLP has independently assessed the effectiveness of our internal control over financial reporting and its report is included below.

(c) Changes in Internal Controls Over Financial Reporting

Except for the remediation measures in connection with the material weaknesses described above, there has been no change in the Company's internal control over financial reporting as of December 31, 2024, that has materially affected, or is reasonably likely to materially affect, the Company's internal control over financial reporting.

(d) Inherent Limitations on Effectiveness of Controls

The design of any system of control is based upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated objectives under all future events, no matter how remote, that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may not deteriorate. Because of their inherent limitations, systems of control may not prevent or detect all misstatements. Accordingly, even effective systems of control can provide only reasonable assurance of achieving their control objectives.

(e) Report of Independent Registered Public Accounting Firm

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders
Harvard Bioscience, Inc.

Opinion on internal control over financial reporting

We have audited the internal control over financial reporting of Harvard Bioscience, Inc. (a Delaware corporation) and subsidiaries (the “Company”) as of December 31, 2024, based on criteria established in the 2013 Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”). In our opinion, because of the effect of the material weaknesses described in the following paragraphs on the achievement of the objectives of the control criteria, the Company has not maintained effective internal control over financial reporting as of December 31, 2024, based on criteria established in the 2013 Internal Control—Integrated Framework issued by COSO.

A material weakness is a deficiency, or combination of control deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the company’s annual or interim financial statements will not be prevented or detected on a timely basis. The following material weaknesses have been identified and included in management’s assessment.

The Company did not design and maintain effective manual controls over the processing and review of a substantial portion of its revenue transactions. Additionally, the Company did not design and maintain an effective cycle count program to verify quantities of a substantial portion of its inventory. The timeliness, level of precision, and appropriate segregation of duties in review processes over revenue transactions and physical counts of inventory were not sufficient to prevent, detect, and correct potential misstatements in the financial statements.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (“PCAOB”), the consolidated financial statements of the Company as of and for the year ended December 31, 2024. The material weaknesses identified above were considered in determining the nature, timing, and extent of audit tests applied in our audit of the 2024 consolidated financial statements, and this report does not affect our report dated March 13, 2025 which expressed an unqualified opinion on those financial statements.

Basis for opinion

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

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

Definition and limitations of internal control over financial reporting

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

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

Other information

We do not express an opinion or any other form of assurance on the remediation activities described in Management’s Report.

/s/ GRANT THORNTON LLP

Hartford, Connecticut
March 13, 2025

Item 9B. *Other Information.*

Not applicable.

Item 9C. *Disclosure Regarding Foreign Jurisdictions that Prevent Inspections.*

Not applicable.

PART III

Item 10. *Directors, Executive Officers and Corporate Governance.*

Incorporated by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A under the Exchange Act in connection with our 2025 Annual Meeting of Stockholders.

Item 11. *Executive Compensation.*

Incorporated by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A under the Exchange Act in connection with our 2025 Annual Meeting of Stockholders.

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

Incorporated by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A under the Exchange Act in connection with our 2025 Annual Meeting of Stockholders.

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

Incorporated by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A under the Exchange Act in connection with our 2025 Annual Meeting of Stockholders.

Item 14. *Principal Accounting Fees and Services.*

Incorporated by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A under the Exchange Act in connection with our 2025 Annual Meeting of Stockholders.

PART IV

Item 15. *Exhibits, Financial Statement Schedules.*

(a) The following documents are filed as part of this Annual Report on Form 10-K or incorporated by reference as indicated:

- (1) *Financial Statements, Schedules, and Exhibits.* We have listed our consolidated financial statements filed as part of this annual report in the index to consolidated financial statements on page F-1.
- (2) *Financial Statement Schedules.* We have omitted all financial statement schedules because they are not applicable or not required or because we have included the necessary information in our consolidated financial statements or related notes.
- (3) *Exhibits.* We have listed the exhibits filed as part of this annual report in the accompanying exhibit index, which follows our consolidated financial statements filed as part of this annual report.

Item 16. *Form 10-K Summary.*

None.

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS
HARVARD BIOSCIENCE, INC.

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders
Harvard Bioscience, Inc.

Opinion on the financial statements

We have audited the accompanying consolidated balance sheets of Harvard Bioscience, Inc. (a Delaware corporation) and subsidiaries (the “Company”) as of December 31, 2024 and 2023, the related consolidated statements of operations, comprehensive loss, stockholders’ equity, and cash flows for each of the two years in the period ended December 31, 2024, and the related notes (collectively referred to as the “financial statements”). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2024 and 2023, and the results of its operations and its cash flows for each of the two years in the period ended December 31, 2024, in conformity with accounting principles generally accepted in the United States of America.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (“PCAOB”), the Company’s internal control over financial reporting as of December 31, 2024, based on criteria established in the 2013 *Internal Control—Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”), and our report dated March 13, 2025, expressed an adverse opinion.

Basis for opinion

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

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

Emphasis of Matter - Going concern

The accompanying financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 2 to the financial statements, as of December 31, 2024, the Company was in default of certain debt covenants under its existing credit agreement, in which the Company had outstanding indebtedness of \$37.4 million. On March 10, 2025, the Company entered into an amendment to its credit agreement pursuant to which the lenders and administrative agent agreed to waive such non-compliance provided that, among other things, the Company’s failure to achieve certain refinancing milestones and consummate a refinancing of its credit agreement by June 30, 2025, would constitute an event of default which would render the amounts outstanding under the credit agreement as immediately due and payable. The Company’s business plan, which is also described in Note 2, contemplates exploring alternatives to refinance its outstanding debt by June 30, 2025. However, the Company’s ability to refinance its debt by June 30, 2025, is uncertain and raises substantial doubt about its ability to continue as a going concern. The financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Critical audit matters

Critical audit matters are matters arising from the current period audit of the financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. We determined that there are no critical audit matters.

/s/ GRANT THORNTON LLP

We have served as the Company’s auditor since 2017.

Hartford, Connecticut
March 13, 2025

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

	December 31,	
	2024	2023
<u>Assets</u>		
Current assets:		
Cash and cash equivalents	\$ 4,108	\$ 4,283
Accounts receivable, net	14,866	16,099
Inventories	23,245	24,716
Other current assets	2,898	3,940
Total current assets	45,117	49,038
Property, plant and equipment, net	5,106	3,981
Operating lease right-of-use assets	6,132	4,773
Goodwill	56,324	57,065
Intangible assets, net	11,132	16,036
Other long-term assets	2,833	6,473
Total assets	<u>\$ 126,644</u>	<u>\$ 137,366</u>
<u>Liabilities and Stockholders' Equity</u>		
Current liabilities:		
Current portion of long-term debt	\$ 36,956	\$ 5,859
Accounts payable	4,787	5,554
Contract liabilities	3,806	4,508
Other current liabilities	9,409	10,621
Total current liabilities	54,958	26,542
Long-term debt, net	-	30,704
Deferred tax liability	710	776
Operating lease liabilities	6,381	4,794
Other long-term liabilities	1,255	1,476
Total liabilities	63,304	64,292
Commitments and contingencies - Note 16		
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:		
44,074,475 shares issued and outstanding at December 31, 2024;		
43,394,509 shares issued and outstanding at December 31, 2023	441	434
Additional paid-in-capital	236,579	232,435
Accumulated deficit	(158,010)	(145,605)
Accumulated other comprehensive loss	(15,670)	(14,190)
Total stockholders' equity	63,340	73,074
Total liabilities and stockholders' equity	<u>\$ 126,644</u>	<u>\$ 137,366</u>

See accompanying notes to condensed consolidated financial statements.

HARVARD BIOSCIENCE, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS
(In thousands, except per share data)

	Year Ended December 31,	
	2024	2023
Revenues	\$ 94,135	\$ 112,250
Cost of revenues	39,369	46,179
Gross profit	54,766	66,071
Sales and marketing expenses	22,212	24,060
General and administrative expenses	21,493	22,757
Research and development expenses	10,406	11,764
Amortization of acquired intangible assets	5,255	5,525
Other operating expenses - Note 2	1,611	71
Total operating expenses	60,977	64,177
Operating (loss) income	(6,211)	1,894
Other income (expense):		
Interest expense	(3,209)	(3,591)
Loss on equity securities - Note 12	(1,593)	(632)
Other income (expense), net	(652)	(227)
Total other expense	(5,454)	(4,450)
Loss before income taxes	(11,665)	(2,556)
Income tax expense	740	859
Net loss	<u>\$ (12,405)</u>	<u>\$ (3,415)</u>
Loss per share:		
Basic and diluted loss per share	<u>\$ (0.28)</u>	<u>\$ (0.08)</u>
Weighted-average common shares:		
Basic and diluted	<u>43,538</u>	<u>42,420</u>

See accompanying notes to condensed consolidated financial statements.

HARVARD BIOSCIENCE, INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
(In thousands)

	Year Ended December 31,	
	2024	2023
Net loss	\$ (12,405)	\$ (3,415)
Other comprehensive income (loss), net of tax:		
Foreign currency translation adjustments	(1,405)	1,507
Defined benefit pension plans, net of tax benefit of \$58 and \$137, respectively	(175)	(446)
Derivative instruments qualifying as cash flow hedges, net of tax of \$-0-	100	(199)
Other comprehensive (loss) income	(1,480)	862
Comprehensive loss	<u>\$ (13,885)</u>	<u>\$ (2,553)</u>

See accompanying notes to consolidated financial statements.

HARVARD BIOSCIENCE, INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(In thousands)

	Number of Shares Issued	Common Stock	Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Loss	Total Stockholders' Equity
Balance at December 31, 2022	42,082	\$ 454	\$ 229,008	\$ (142,190)	\$ (15,052)	\$ 72,220
Stock option exercises	214	-	506	-	-	506
Stock purchase plan	137	-	424	-	-	424
Vesting of restricted stock units	1,460	-	-	-	-	-
Shares withheld for taxes	(498)	-	(2,523)	-	-	(2,523)
Stock-based compensation	-	-	5,000	-	-	5,000
Net loss	-	-	-	(3,415)	-	(3,415)
Other comprehensive income	-	-	-	-	862	862
Other adjustments	-	(20)	20	-	-	-
Balance at December 31, 2023	43,395	434	232,435	(145,605)	(14,190)	73,074
Stock option exercises	14	-	43	-	-	43
Stock purchase plan	161	2	335	-	-	337
Vesting of restricted stock units	769	8	-	-	-	8
Shares withheld for taxes	(265)	(3)	(574)	-	-	(577)
Stock-based compensation	-	-	4,340	-	-	4,340
Net loss	-	-	-	(12,405)	-	(12,405)
Other comprehensive loss	-	-	-	-	(1,480)	(1,480)
Balance at December 31, 2024	44,074	\$ 441	\$ 236,579	\$ (158,010)	\$ (15,670)	\$ 63,340

See accompanying notes to consolidated financial statements.

HARVARD BIOSCIENCE, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(In thousands)

	Year Ended December 31,	
	2024	2023
Cash flows from operating activities:		
Net loss	\$ (12,405)	\$ (3,415)
Adjustments to reconcile net loss to net cash provided by operating activities:		
Depreciation	1,727	1,473
Amortization of intangible assets	5,430	5,525
Amortization of deferred financing costs	327	280
Stock-based compensation	4,340	5,000
Deferred income taxes and other	363	336
Loss on equity securities - Note 12	1,593	632
Gain on sale of product line - Note 17	-	(403)
Changes in operating assets and liabilities:		
Accounts receivable	974	810
Inventories	(64)	1,524
Other assets	1,642	1,651
Accounts payable and other liabilities	(1,785)	(523)
Contract liabilities	(702)	1,138
Net cash provided by operating activities	<u>1,440</u>	<u>14,028</u>
Cash flows from investing activities:		
Additions to property, plant and equipment	(2,644)	(1,788)
Capitalized software development costs	(619)	(523)
Proceeds from sale of product line	-	512
Proceeds from sale of marketable equity securities	1,919	-
Net cash used in investing activities	<u>(1,344)</u>	<u>(1,799)</u>
Cash flows from financing activities:		
Borrowing from revolving line of credit	8,800	4,500
Repayment of revolving line of credit	(2,550)	(10,950)
Repayment of term debt	(6,023)	(4,091)
Payment of debt issuance costs	(161)	-
Proceeds from exercise of stock options and employee stock purchase plan	380	930
Taxes paid related to net share settlement of equity awards	(577)	(2,523)
Net cash used in financing activities	<u>(131)</u>	<u>(12,134)</u>
Effect of exchange rate changes on cash	<u>(140)</u>	<u>(320)</u>
Decrease in cash and cash equivalents	<u>(175)</u>	<u>(225)</u>
Cash and cash equivalents at beginning of period	4,283	4,508
Cash and cash equivalents at end of period	<u>\$ 4,108</u>	<u>\$ 4,283</u>
Supplemental disclosures of cash flow information:		
Cash paid for interest	<u>\$ 3,235</u>	<u>\$ 3,795</u>
Cash paid for income taxes, net of refunds	<u>\$ (159)</u>	<u>\$ 207</u>

See accompanying notes to consolidated financial statements.

HARVARD BIOSCIENCE, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Organization

Harvard Bioscience, Inc., a Delaware corporation (the “Company”), is a leading developer, manufacturer and seller of technologies, products and services that enable fundamental advances in life science applications, including research, pharmaceutical and therapy discovery, bioproduction and preclinical testing for pharmaceutical and therapy development. The Company’s products and services are sold globally to customers ranging from renowned academic institutions and government laboratories to the world’s leading pharmaceutical, biotechnology and contract research organizations (“CROs”). With operations in the United States, Europe and China, the Company sells through a combination of direct and distribution channels to customers around the world.

2. Summary of Significant Accounting Policies

Principles of Consolidation

The consolidated financial statements include the accounts of Harvard Bioscience, Inc. and its wholly owned subsidiaries. All intercompany balances and transactions have been eliminated in consolidation.

The consolidated financial statements for the fiscal year ended December 31, 2024, have been prepared assuming that the Company will continue as a going concern. A going-concern basis assumes that the Company will continue its operations for the foreseeable future and contemplates the realization of assets and the settlement of liabilities in the normal course of business. As noted below, there is substantial doubt about the Company’s ability to continue as a going concern.

As of December 31, 2024, there was indebtedness of \$37.4 million outstanding under the Company's term loan and senior revolving credit facility (collectively, the “Credit Agreement”). The Company was not in compliance with the consolidated net leverage ratio covenant contained in the Credit Agreement as of the December 31, 2024 test date. On March 10, 2025, the Company entered into an amendment to the Credit Agreement (the “March 2025 Amendment”) pursuant to which the lenders and administrative agent agreed to waive such non-compliance, subject to the terms contained in the March 2025 Amendment. The March 2025 Amendment provides, among other things, that the Company's failure to achieve certain refinancing milestones, including receipt of a term sheet or commitment letter from one or more potential lenders, by the dates provided in the March 2025 Amendment or the Company's failure to consummate a refinancing of the Credit Agreement by June 30, 2025, would, in either case, constitute an event of default under the Credit Agreement. In such event, in addition to other actions the lenders may require, the amounts outstanding under the Credit Agreement may become immediately due and payable.

The Company is exploring alternative sources of capital that would allow it to refinance the outstanding indebtedness by June 30, 2025, in order to avoid default under the Credit Agreement, but its ability to access such other sources of capital is uncertain. There is no assurance that such capital will be available, be obtainable on commercially acceptable terms, or provide the Company with sufficient funds to meet its objectives. Based on its anticipated cash flows from operations, unless the Company is able to access other sources of capital or extend the date for repayment under the Credit Agreement, the Company will be unable to pay its debt obligations and fund its operations for at least twelve months from the date of issuance of the consolidated financial statements contained in this Annual Report on Form 10-K. As a result, there is substantial doubt about the Company's ability to continue as a going concern.

Use of Estimates

The preparation of financial statements in conformity with generally accepted accounting principles in the United States requires the use of management estimates. Such estimates include the determination and establishment of certain accruals and provisions, including those for income taxes, credit losses on receivables, and defined benefit pension obligations. Estimates are also required to assess the value for inventories reported at lower of cost or net realizable value, stock-based compensation expense, and the recoverability of long-lived and intangible assets, including goodwill. On an ongoing basis, the Company assesses its previous estimates based upon currently available information. Actual results could differ materially from those estimates.

Revenue Recognition

Nature of contracts and customers

The Company’s contracts are primarily of short duration and are mostly based on the receipt and fulfilment of purchase orders. The purchase orders are binding and include pricing and all other relevant terms and conditions.

The Company's customers are primarily research scientists at pharmaceutical and biotechnology companies, universities, hospitals, government laboratories and contract research organizations. The Company also has global and regional distribution partners, and original equipment manufacturer customers who incorporate its products into their products under their own brands.

Performance obligations

The Company's performance obligations under its revenue contracts consist of its instruments, equipment, accessories, consumables, services, software licenses and enhancements, maintenance and extended warranties. Equipment also includes software that functions together with the tangible equipment to deliver its essential functionality. Contracts with customers may contain multiple promises such as delivery of hardware, software, professional services or post-contract support services. These promises are accounted for as separate performance obligations if they are distinct. For contracts with customers that contain multiple performance obligations, the transaction price is allocated to the separate performance obligations based on relative standalone selling price, which does not materially differ from the stated price in the contract. In general, the Company's list prices are indicative of standalone selling price, and the majority of the Company's contracts have a term of less than one year.

Instruments, equipment and accessories consist of a range of products that are used in life sciences research. Revenues from the sales of these items are recognized when transfer of control of these products to the customer occurs. Transfer of control occurs when the Company has the right to payment and the customer has legal title to the asset and the customer or their selected carrier has possession, which is typically upon shipment. Sales of these items are therefore generally recognized at a point in time.

The Company's consumables revenue includes the sale of wireless implantable monitors that are used for life science research purposes. The Company sells these wireless implantable monitors to pharmaceutical companies, contract research organizations and academic laboratories. In addition to sales generated from new and existing customers, these implantable devices are also sold under a program called the "exchange program." Under this program, customers may return an implantable monitor to the Company after use, and if the returned monitor can be reprocessed and resold, they may, in exchange, purchase a replacement implantable monitor of the same model at a lower price than a new monitor. The implantable monitors that are returned by customers are reprocessed and made available for future sale. The initial sale of implantable monitors and subsequent sale of replacement implantable monitors are independent transactions. The Company has no obligation in connection with the initial sale to sell replacement implantable monitors at any future date under any fixed terms and may refuse returned implantable monitors that cannot be recovered or are obsolete. The Company has concluded that the offer to its customers that they may purchase a discounted product in the future is not a material right as the discounted price represents the standalone selling price of the reprocessed implantable monitor.

Service revenue consists of installation, training, data analysis and surgeries performed on research animals. Service revenue is recognized when the service is performed. Maintenance revenue consists of post-contract support provided in relation to software that is embedded within the equipment that is sold to the customer. The Company provides standard warranties that promise the customer that the product will work as promised and are not a separate performance obligation. Extended warranties relate to warranties that are separately priced and purchased in addition to a standard warranty and are therefore a separate performance obligation. The Company has made the judgment that the customer benefits as the Company performs over the period of the contract, and therefore revenues from maintenance and warranty contracts are recognized over time. The Company uses the input method to recognize revenue over time, which is generally on a straight-line basis over the service period.

For sales for which transfer of control occurs upon shipment, the Company accounts for shipping and handling costs as fulfillment costs. As such, the Company records the amounts billed to the customer for shipping costs as revenue and the costs within cost of revenues upon shipment. For sales, for which control transfers to customers after shipment, the Company has elected to account for shipping and handling as activities to fulfill the promise to transfer the goods to the customer. The Company therefore accrues for the costs of shipping undelivered items in the period of shipment.

Variable Consideration

The nature of the Company's contracts gives rise to certain types of variable consideration, including in limited cases volume and payment discounts. The Company analyzes sales that could include variable consideration and estimates the expected or most likely amount of revenue after returns, trade-ins, discounts, rebates, credits, and incentives. Product returns are estimated and accrued for, based on historical information. In making these estimates, the Company considers whether the amount of variable consideration is constrained and is included in revenue only to the extent that it is probable that a significant reversal of the revenue recognized will not occur when the uncertainty associated with the variable consideration is subsequently resolved. Variable consideration, and its impact on the Company's revenue recognition, was not material in any of the periods presented.

The Company's payment terms are generally from zero to sixty days from the time of invoicing, which occurs at the time of shipment or prior to services being performed. Payment terms vary by the type of customers and the products or services offered.

Sales taxes, value added taxes, and certain excise taxes collected from customers and remitted to governmental authorities are accounted for on a net basis and are therefore excluded from revenues.

In certain subsidiaries the Company provides sales commissions to sales representatives based on annual sales volume. The Company has determined that the incentive portion of its sales commissions qualify as contract costs. The Company has elected the practical expedient in ASC 340-40-25-4 to expense sales commissions when incurred as the amortization period of the asset that would otherwise have been recognized is one year or less.

Contract Liabilities

The Company records contract liabilities when cash is collected from customers prior to satisfaction of the Company's performance obligation to the customer. Contract liabilities consist of amounts deferred related to service contracts and revenue deferred as a result of payments received in advance from customers. Contract liabilities are generally expected to be recognized within one year.

The amounts included in contract liabilities from advanced payments relate to amounts that are prepaid for wireless implantable monitors under the exchange program. The Company has made the judgment that these payments do not represent a significant financing component as the customer can exercise their discretion as to when they can obtain the products for which they have made a prepayment.

Disaggregation of revenue

Refer to Note 3 for revenue disaggregated by type and by geographic location as well as further information about contract liabilities.

Cash and Cash Equivalents

The Company considers all highly liquid instruments with original maturities of three months or less to be cash equivalents. The Company has cash holdings in financial institutions that exceed insured limits for such financial institutions. The Company mitigates this risk by utilizing financial institutions of high credit quality.

Approximately 66% of the Company's cash and cash equivalents at December 31, 2024, was held by the Company's foreign subsidiaries and subject to repatriation tax considerations. These foreign funds were held primarily by subsidiaries in the United Kingdom, Germany and Spain.

Marketable Equity Securities

Equity securities traded in active markets are marked to market at each balance sheet date based on prices as quoted on the relevant stock exchange. Fair value mark-to-market adjustments are recorded as non-operating gains (losses) in the consolidated statement of operations. The Company's investments in marketable equity securities are classified in the consolidated balance sheet based on the nature of the securities and their availability for use in current operations.

Allowance for Expected Credit Losses on Receivables

The allowance for expected credit losses on receivables is used to present accounts receivable, net, at an amount that represents the Company's estimate of the receivables expected to be collected from customers. The allowance represents an estimate of expected credit losses over the lifetime of the receivables, even if the loss is considered remote, and reflects expected recoveries of amounts previously written off. The Company estimates the allowance on the basis of specifically identified receivables that are evaluated individually for impairment and an analysis of the remaining receivables determined by reference to past default experience. The Company considers the need to adjust historical information to reflect the extent to which current conditions and reasonable forecasts are expected to differ from the conditions that existed for the historical period considered. Losses on receivables have not historically been significant.

Management judgments are used to determine when to charge off uncollectible trade accounts receivable. The Company bases these judgments on the age of the receivable, credit quality of the customer, current economic conditions, and other factors that may affect a customer's ability and intent to pay. Customers are generally not required to provide collateral for purchases.

Inventories

The Company values inventories at the lower of cost (determined on a first-in, first-out method) or net realizable value. The Company regularly reviews inventory quantities on hand and writes down excess and obsolete inventories to estimated net realizable value if less than cost, based primarily on historical inventory usage and estimated forecast of product demand.

Property, Plant and Equipment

Property, plant and equipment are stated at cost and depreciated using the straight-line method over the estimated useful lives of the assets as follows:

Machinery and equipment and automobiles (years)	3 - 10
Computer equipment and software (years)	3 - 7
Furniture and fixtures (years)	5 - 10

Leasehold improvements are amortized using the straight-line method over the shorter of the lease term or estimated useful life of the asset.

Software Development

Software development costs for software products to be sold, leased or otherwise marketed that are incurred before establishing technological feasibility are charged to operations. Software development costs incurred after establishing technological feasibility are capitalized on a product-by-product basis until the product is available for general release to customers at which time amortization begins.

Annual amortization, charged to cost of goods sold, is the amount computed using the ratio that current revenues for a product bear to the total current and anticipated future revenues for that product. In the event that future revenues are not estimable, such costs are amortized on a straight-line basis over the remaining estimated economic life of the product.

Goodwill

Goodwill acquired in a business combination and determined to have an indefinite useful life is not amortized, but instead is tested for impairment annually or more frequently if events or changes in circumstances indicate that the asset might be impaired.

For the purpose of its goodwill analysis, the Company has one reporting unit. The Company conducts its annual impairment analysis in the fourth quarter of the fiscal year and more frequently if there is an indicator of impairment. The Company assesses qualitative factors of the reporting unit to determine whether it is more likely than not that the fair value of the reporting unit is less than its carrying value. If the qualitative assessment indicates a potential impairment, a quantitative analysis is performed. The Company compares the fair value of the reporting unit with its carrying amount. The Company typically estimates fair value using market approaches but will also consider the income approach when appropriate. If the carrying amount of a reporting unit exceeds its fair value, goodwill is impaired, and the Company would recognize a loss equal to the excess.

During the year ended December 31, 2024, as a result of the Company's underperformance of recent operating results and liquidity risk and the current macroeconomic conditions impacting the life sciences industries, the Company assessed the current and future economic outlook and identified indicators for impairment of goodwill. Based on the quantitative analysis, the Company concluded that goodwill was not impaired due to the excess of fair value over the carrying value of the reporting unit. Based on declines in the Company's stock price subsequent to December 31, 2024, the carrying value of stockholders' equity currently exceeds its fair value, which could lead to future impairment.

Intangible Assets

Intangible assets are comprised of existing technology, customer contracts and contractual relationships, and other definite-lived intangible assets. Identifiable intangible assets resulting from the acquisitions of entities accounted for using the purchase method of accounting are estimated by the Company based on the fair value of assets received. Identifiable definite-lived intangible assets are being amortized over the period of estimated benefit using the straight-line method and estimated useful lives ranging from four to fifteen years.

Impairment of Long-Lived Assets

The Company assesses recoverability of its long-lived assets that are held for use, such as property, plant and equipment and amortizable intangible assets when events or changes in circumstances indicate that the carrying amount of an asset or asset group may not be recoverable. Factors which could trigger an impairment review include significant negative industry or economic trends, significant loss of clients, and significant changes in the manner of the Company's use of the assets or the strategy for its overall business.

The recoverability of assets or an asset group to be held and used is measured by a comparison of the carrying amount of an asset or asset group to estimated undiscounted future cash flows expected to be generated by the asset or the asset group. Cash flow projections are based on trends of historical performance and management's estimate of future performance. The Company's estimate of future cash flows requires significant judgment based on historical and anticipated results and are subject to many factors.

When the Company determines that the carrying value of the assets may not be recoverable based upon the existence of one or more of the above indicators of impairment, the Company measures the potential impairment based on a projected discounted cash flow method using a discount rate determined by management to be commensurate with the risk inherent in its current business model. An impairment loss is recognized only if the carrying amount of the asset is not recoverable and exceeds its fair value. Different assumptions and judgments could materially affect the calculation of the fair value of the Company's assets. For the year ended December 31, 2024, the Company concluded that there were triggering events requiring the Company to assess the recoverability of its long-lived assets. Based on its recoverability assessment, the Company determined that there was no impairment. If future operating performance of the reporting units is not consistent with these assumptions, the Company could be required to record non-cash impairment charges.

Commitments and Contingencies

Liabilities for loss contingencies arising from claims, assessments, litigation, fines and penalties, and other sources are recorded when it is probable that a liability has been incurred and the amount of the assessment can be reasonably estimated. If a loss is reasonably possible and the loss or range of loss can be reasonably estimated, the Company discloses the possible loss. If a loss is probable and the loss or range of loss cannot be reasonably estimated, the Company discloses or states that such an estimate cannot be made. Refer to Note 16 Commitments and Contingencies for additional information. The Company accrues and expenses legal costs associated with contingencies when incurred.

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 only enters into derivative contracts that it intends to designate as a hedge of a forecasted transaction or the variability of cash flows to be received or paid related to a recognized asset or liability (cash flow hedge) and does not use derivative financial instruments for trading or speculative purposes. The Company recognizes all derivative instruments as either assets or liabilities in the balance sheet at their respective fair values.

The Company formally documents the hedging relationship and its risk-management objective and strategy for undertaking the hedge, the hedging instrument, the hedged transaction, the nature of the risk being hedged, how the hedging instrument's effectiveness in offsetting the hedged risk will be assessed prospectively and retrospectively, and a description of the method used to measure ineffectiveness. For derivative instruments that are designated and qualify as part of a cash flow hedging relationship, the effective portion of the gain or loss on the derivative is reported as a component of other comprehensive income (loss) ("OCI") and reclassified into earnings in the same period or periods during which the hedged transaction affects earnings. Gains and losses on the derivative representing either hedge ineffectiveness or hedge components excluded from the assessment of effectiveness are recognized in current earnings.

By using derivative financial instruments to hedge exposure 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 major financial institutions based upon their credit profile. Market risk has an 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 monitors interest rate risk attributable to both its outstanding and forecasted debt obligations by the use of cash flow sensitivity analysis, which estimates the expected impact of changes in interest rates on the Company's future cash flows.

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 for the Company to control the use of the identified property, plant or equipment for a 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.

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 the leases’ 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 terms in our leases may include options to extend or terminate the lease. We recognize ROU assets and liabilities when it is reasonably certain that we will exercise those options. Judgement is required in our assessment as to whether renewal or termination options are reasonably certain to be exercised and factors such as contractual terms compared to current market rates and the importance of the facility and location to our operations, among others, are considered. The Company has lease agreements with lease and non-lease components, which are generally accounted for separately.

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 from stockholders. As of December 31, 2024, and 2023, the Company had no preferred stock issued or outstanding.

Stock-based Compensation

The Company recognizes compensation expense for all stock-based payment awards made to employees and directors including stock options, restricted stock units, and restricted stock units with a market or performance condition. The Company issues awards under the 2021 Incentive Plan (the “2021 Incentive Plan”) and the Fourth Amended and Restated 2000 Stock Option and Incentive Plan (the “2000 Incentive Plan,” together with the 2021 Incentive Plan, together referred to as the “Incentive Plans”), as well as issues shares for employee stock purchases related to its Employee Stock Purchase Plan (as amended, the “ESPP”). The Company issues new shares from its registered but unissued stock pool to satisfy stock option exercises and vesting of the restricted stock units. Stock-based compensation expense is recorded on a straight-line basis over the applicable service period, which ranges from one to four years. 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.

The fair value of restricted stock units is based on the market price of the Company’s stock on the date of grant. The Company values restricted stock units with a market condition using a Monte-Carlo valuation simulation. The determination of fair value of stock-based payment awards on the date of grant using a Monte-Carlo valuation simulation is affected by the Company’s stock price as well as assumptions regarding certain variables including, but are not limited to, the Company’s expected stock price volatility over the term of the awards, interest rate assumptions, and discounts to adjust for any holding period post-vest restrictions.

Performance-based RSU awards are contingent on the achievement of certain performance metrics. Compensation cost associated with performance-based RSUs are recognized based on the estimated number of shares that the Company ultimately expects will be earned. If the estimated number of shares to be earned is revised in the future, then stock-based compensation expense will be adjusted accordingly.

Income Taxes

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases. Deferred tax assets and liabilities are measured using enacted tax rates expected to be applied to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in income in the period that includes the enactment date. The Company uses the flow-through method to account for investment tax credits. Under this method, the investment tax credits are recognized as a reduction of income tax expense.

The Company recognizes the effect of income tax positions only if those positions are more likely than not of being sustained. Recognized income tax positions are measured at the largest amount that is more than 50% likely of being realized. Changes in recognition are reflected in the period in which the judgement occurs. The Company's policy is to account for Global Intangible Low-Taxed income ("GILTI") as a period cost.

Comprehensive Income (Loss)

Comprehensive income (loss) represents the change in equity resulting from items other than shareholder investments and distributions. The Company's foreign currency translation adjustments, interest rate swap - cash flow hedge and minimum pension liability adjustments are included in accumulated other comprehensive income ("AOCI"). The components of other comprehensive income are reclassified as net income, net of tax, when the underlying component impacts earnings. Comprehensive income (loss) and the components of AOCI are presented in the accompanying consolidated statements of comprehensive loss and consolidated statements of equity.

Fair Value of Financial Instruments

Financial reporting standards define a fair value hierarchy that consists of three levels:

- Level 1 includes instruments for which quoted prices in active markets for identical assets or liabilities accessible to the Company at the measurement date.
- Level 2 includes instruments for which the valuations are based on quoted prices for similar assets or liabilities, quoted prices in markets that are not active, or other inputs that are observable or can be corroborated by observable data for substantially the full term of the assets or liabilities.
- Level 3 includes valuations based on inputs that are unobservable and significant to the overall fair value measurement.

The carrying values of the Company's cash and cash equivalents, trade accounts receivable, trade accounts payable and short-term debt approximate their fair values because of the short maturities of those instruments. The fair value of the Company's debt approximates its carrying value and is based on the amount of future cash flow associated with the debt discounted using current borrowing rates for similar debt instruments of comparable maturity (Level 2).

Foreign Currency

The functional currency of the Company's foreign subsidiaries is generally their local currency. All assets and liabilities of foreign subsidiaries are translated at exchange rates in effect at period-end. Income and expenses are translated at rates which approximate those in effect on the transaction dates. The resulting translation adjustment is recorded as a separate component of stockholders' equity in AOCI in the consolidated balance sheets. Gains and losses resulting from foreign currency transactions are included in other income (expense), net, in the Company's consolidated statements of operations.

Earnings per Share

Basic earnings (loss) per share is computed by dividing net income by the weighted average number of shares of common stock outstanding during the periods presented. The computation of diluted earnings (loss) per share is similar to the computation of basic earnings per share, except that the denominator is increased for the assumed exercise of dilutive options and other potentially dilutive securities using the treasury stock method unless the effect is antidilutive. The following table sets forth the computation of basic and diluted loss per share:

	Year Ended December 31,	
	2024	2023
(in thousands, except per share data)		
Net loss	\$ (12,405)	\$ (3,415)
Weighted average shares outstanding - basic	43,538	42,420
Dilutive effect of equity awards	-	-
Weighted average shares outstanding - diluted	43,538	42,420
Basic loss per share	\$ (0.28)	\$ (0.08)
Diluted loss per share	\$ (0.28)	\$ (0.08)
Shares excluded from diluted loss per share due to their anti-dilutive effect	3,577	3,868

Business Segment Information

The Company operates in one segment which involves the design, development, production and distribution of products and services that enable fundamental advances in life science applications, including research, pharmaceutical and therapy discovery, bioproduction and preclinical testing for pharmaceutical and therapy development. The Company has a single, company-wide management team that administers all properties as a whole rather than discrete operating segments. The chief operating decision maker ("CODM"), who is the Company's chief executive officer, measures financial performance as a single enterprise and allocates resources across the Company to maximize profitability, and not on geography, legal entity, or end market basis. The Company operates in a number of countries throughout the world in a variety of product lines. Information regarding product lines and geographic financial information is provided in Note 3, "Revenues" and Note 6, "Balance Sheet Information."

Other Operating Expenses

The components of other operating expenses for the year ended December 31, 2024 and 2023, were as follows:

	Year Ended December 31,	
	2024	2023
(in thousands)		
Restructuring expenses (see Note 7)	\$ 792	\$ 71
Unclaimed property audits expense (see Note 16)	347	-
Employee retention tax credit fees (see Note 18)	472	-
Total other operating expenses	\$ 1,611	\$ 71

Recently Issued Accounting Pronouncements Adopted

In November 2023, the Financial Accounting Standards Board ("FASB") issued Accounting Standards

Update ("ASU") No. 2023-07, *Segment Reporting (Topic 280): Improvements to Reportable Segment Disclosures*, which improves reportable segment disclosure requirements, primarily through enhanced disclosures about significant segment expenses on an annual and interim basis. Entities with a single reportable segment must provide all the disclosures required by this ASU and all existing segment disclosures in Topic 280. ASU 2023-07 was effective for fiscal years beginning after December 15, 2023, and interim periods within fiscal years beginning after December 15, 2024. The adoption of this standard impacted footnote disclosures and did not have a material impact on the Company's consolidated financial statements.

Recently Issued Accounting Pronouncements Yet to be Adopted

In December 2023, the FASB issued ASU No. 2023-09, *Income Taxes (Topic 740): Improvements to Income Tax*, which enhances disclosures related to the effective tax rate reconciliation, income taxes paid, as well as other disclosures. The new standard impacts footnote disclosures and is effective for the Company's annual financial statements for the year ended December 31, 2025. The Company is currently evaluating the impact that adopting ASU No. 2023-09 will have on the footnote disclosures in its consolidated financial statements.

In November 2024, the FASB issued ASU No. 2024-03, *Income Statement (Subtopic 220-40): Reporting Comprehensive Income—Expense Disaggregation Disclosures*, which requires enhanced disclosure of income statement expense categories to improve transparency and provide financial statement users with more detailed information about the nature, amount and timing of expenses impacting financial performance. This new guidance is effective for annual reporting periods beginning after December 15, 2026, and interim reporting periods beginning after December 15, 2027, with early adoption permitted. The Company is currently evaluating the impact that adopting ASU No. 2024-03 will have on the footnote disclosures in its consolidated financial statements.

Correction of Unaudited Interim Financial Statements

In August 2024, the Company initiated the process of terminating one of its defined benefit plans by purchasing from plan assets a non-participating bulk annuity from an insurance company (a “buy-in” arrangement”). This bulk annuity will be used to purchase individual annuity contracts for each participant (a “buy-out” arrangement), which is expected to occur in 2025. During the three months ended September 30, 2024, the Company recorded a non-cash loss on pension settlement of \$1.2 million, including the immediate recognition of the portion of the AOCI balances related to this plan.

During the three months ended December 31, 2024, the Company determined that the buy-in transaction does not result in settlement accounting as the Company has not been relieved of primary responsibility for the benefit obligation. As a result, the Company identified an immaterial error associated with recording a loss on pension settlement in other income (expense), net, in its interim financial statements for the three and nine months ended September 30, 2024. This immaterial error overstated the loss before income taxes by \$1.2 million and the net loss by \$0.9 million for the three and nine months ended September 30, 2024, and overstated the loss per share loss by \$0.02 and \$0.03 for the three and nine months ended September 30, 2024, respectively. This error had no impact on the operating loss or cash flows from operations for the three and nine months ended September 30, 2024. The correction of this immaterial error is included in these unaudited consolidated financial statements.

Prior Period Financial Statement Reclassifications

Certain immaterial reclassifications have been made to the prior year financial statements to conform to the current presentation.

3. Revenues

The following table represents a disaggregation of revenue from contracts with customers for the years ended December 31, 2024, and 2023:

Revenues by type were as follows:

	Year Ended December 31,	
	2024	2023
(in thousands)		
Instruments, equipment, software and accessories	\$ 86,964	\$ 105,716
Service, maintenance and warranty contracts	7,171	6,534
Total revenues	<u>\$ 94,135</u>	<u>\$ 112,250</u>

Revenues by timing of recognition were as follows:

	Year Ended December 31,	
	2024	2023
(in thousands)		
Goods and services transferred at a point in time	\$ 90,420	\$ 108,558
Goods and services transferred over time	3,715	3,692
Total revenues	<u>\$ 94,135</u>	<u>\$ 112,250</u>

Revenues by geographic destination were as follows:

(in thousands)	Year Ended December 31,	
	2024	2023
Americas		
United States	\$ 41,738	\$ 48,205
Americas - Other	3,596	3,517
Europe, Middle East and Africa	28,405	33,275
Asia		
Greater China	13,297	18,488
Asia - Other	7,099	8,765
	<u>\$ 94,135</u>	<u>\$ 112,250</u>

Contract Liabilities

The following table provides a summary of contract liabilities as of the periods indicated:

(in thousands)	December 31,			Change	
	2024	2023	2022	2024 vs. 2023	2023 vs. 2022
Service, maintenance and warranty contracts	\$ 2,366	\$ 2,849	\$ 1,530	\$ (483)	\$ 1,319
Customer advances	1,440	1,659	1,840	(219)	(181)
Total contract liabilities	<u>\$ 3,806</u>	<u>\$ 4,508</u>	<u>\$ 3,370</u>	<u>\$ (702)</u>	<u>\$ 1,138</u>

Changes in the Company's contract liabilities are primarily due to the timing of receipt of payments under service, maintenance and warranty contracts and lower revenue volumes. During the years ended December 31, 2024, and 2023, the Company recognized revenue of \$3.4 million and \$2.1 million from contract liabilities existing at December 31, 2023 and 2022, respectively.

Provision for Expected Credit Losses on Receivables

Activity in the provision for expected losses on receivables was as follows:

(in thousands)	December 31,	
	2024	2023
Balance, beginning of period	\$ 160	\$ 191
Provision for expected credit losses	60	29
Charge-offs and other	(5)	(60)
Balance, end of period	<u>\$ 215</u>	<u>\$ 160</u>

Concentrations

No customer accounted for more than 10% of revenue for the years ended December 31, 2024, and 2023, or for more than 10% of net accounts receivable at December 31, 2024 and 2023.

Warranties

Warranty activity was as follows:

(in thousands)	Year Ended December 31,	
	2024	2023
Balance, beginning of period	\$ 336	\$ 268
Provision for warranties	317	381
Warranty claims	(335)	(313)
Balance, end of period	<u>\$ 318</u>	<u>\$ 336</u>

4. Accumulated Other Comprehensive Loss

Changes in the components of accumulated other comprehensive loss, net of tax, for the years ended December 31, 2024 and 2023, respectively, were as follows:

	Foreign Currency Translation Adjustments	Defined Benefit Pension Plans	Derivatives Qualifying as Hedges	Total
(in thousands)				
Balance at December 31, 2022	\$ (11,392)	\$ (3,660)	\$ -	\$ (15,052)
Other comprehensive income (loss), net	1,507	(446)	(199)	862
Balance at December 31, 2023	(9,885)	(4,106)	(199)	(14,190)
Other comprehensive income (loss), net	(1,405)	(175)	100	(1,480)
Balance at December 31, 2024	<u>\$ (11,290)</u>	<u>\$ (4,281)</u>	<u>\$ (99)</u>	<u>\$ (15,670)</u>

5. Goodwill and Intangible Assets

The change in the carrying amount of goodwill was as follows:

	December 31,	
	2024	2023
(in thousands)		
Carrying amount at beginning of period	\$ 57,065	\$ 56,260
Effect of change in currency translation	(741)	805
Carrying amount at end of period	<u>\$ 56,324</u>	<u>\$ 57,065</u>

Intangible assets, net at December 31, 2024 and 2023 consisted of the following:

		December 31, 2024			December 31, 2023		
(in thousands)	Average Life*	Gross	Accumulated Amortization	Net	Gross	Accumulated Amortization	Net
Amortizable intangible assets:							
Customer relationships	5	\$ 15,603	\$ (10,450)	\$ 5,153	\$ 16,038	\$ (9,706)	\$ 6,332
Technology and software development	1	35,397	(30,556)	4,841	35,007	(27,029)	7,978
Trade names and patents	2	7,452	(6,509)	943	7,613	(6,094)	1,519
Total amortizable intangible assets		<u>\$ 58,452</u>	<u>\$ (47,515)</u>	<u>\$ 10,937</u>	<u>\$ 58,658</u>	<u>\$ (42,829)</u>	<u>\$ 15,829</u>
Indefinite-lived intangible assets:				195			207
Total intangible assets				<u>\$ 11,132</u>			<u>\$ 16,036</u>

* Weighted average remaining life in years as of December 31, 2024

The Company capitalized \$0.6 million and \$0.5 million of software development costs during the year ended December 31, 2024, and 2023, respectively.

Intangible asset amortization expense was \$5.4 million and \$5.5 million for the years ended December 31, 2024 and 2023, respectively.

	Year Ended December 31,	
	2024	2023
(in thousands)		
Cost of revenues	\$ 175	\$ -
Operating expense	5,255	5,525
Total amortization of intangible assets	<u>\$ 5,430</u>	<u>\$ 5,525</u>

Estimated amortization expense of existing amortizable intangible assets for each of the five succeeding years and thereafter is as follows:

(in thousands)	
2025	\$ 4,397
2026	2,736
2027	1,464
2028	1,011
2029	935
Thereafter	394
Total	<u>\$ 10,937</u>

6. Balance Sheet Information

The following tables provide details of selected balance sheet items as of the periods indicated:

Inventories:

(in thousands)

	December 31,	
	2024	2023
Finished goods	\$ 5,222	\$ 5,120
Work in process	2,754	4,188
Raw materials	15,269	15,408
Total	<u>\$ 23,245</u>	<u>\$ 24,716</u>

Property, Plant and Equipment:

(in thousands)

	December 31,	
	2024	2023
Machinery and equipment	\$ 8,139	\$ 8,154
Computer equipment and software	8,923	6,493
Leasehold improvements	2,565	2,417
Furniture and fixtures	1,243	1,244
Automobiles	56	58
	<u>20,926</u>	<u>18,366</u>
Less: accumulated depreciation	(15,820)	(14,385)
Property, plant and equipment, net	<u>\$ 5,106</u>	<u>\$ 3,981</u>

Depreciation expense was \$1.7 million and \$1.5 million for the years ended December 31, 2024 and 2023, respectively.

Other Current Liabilities:

(in thousands)

	December 31,	
	2024	2023
Compensation	\$ 1,714	\$ 3,929
Customer credits	1,286	3,201
Current portion of operating lease liabilities	1,158	1,416
Employee retention tax credit funds - Note 18	3,154	-
Professional fees	545	499
Warranty costs	318	336
Other	1,234	1,240
Total	<u>\$ 9,409</u>	<u>\$ 10,621</u>

Long-lived Assets by Geographic Area:

Long-lived assets by geographic area, which include operating lease right-of-use assets, property, plant and equipment, and amortizable intangible assets, were as follows:

(in thousands)	December 31,	
	2024	2023
United States	\$ 20,235	\$ 21,558
Germany	1,148	1,703
Rest of the world	792	1,322
Total long-lived assets	<u>\$ 22,175</u>	<u>\$ 24,583</u>

7. Restructuring Costs

On an ongoing basis, the Company reviews the global economy, the healthcare industry, and the markets in which it competes to identify operational efficiencies and align its cost base and infrastructure with customer needs and its strategic plans. In order to realize these goals, the Company undertakes activities from time to time to optimize its business.

During the year ended December 31, 2024 and 2023, the Company completed restructurings and incurred expenses of \$0.8 million and \$0.4 million, respectively. These costs primarily consisted of severance incurred in connection with headcount reductions in Europe and North America and purchase order cancellation costs.

The changes in the accrued liabilities for restructuring and other charges for the years ended December 31, 2024 and 2023 were as follows:

(in thousands)	Inventory- Related	Severance	Other	Total
Balance at December 31, 2022	\$ -	\$ 636	\$ -	\$ 636
Restructuring costs	320	42	29	391
Non-cash charges	(142)	-	-	(142)
Cash payments	(94)	(678)	(29)	(801)
Balance at December 31, 2023	\$ 84	\$ -	\$ -	\$ 84
Restructuring costs	43	792	-	835
Non-cash charges	(27)	-	-	(27)
Cash payments	(100)	(711)	-	(811)
Effect of change in currency translation	-	1	-	1
Balance at December 31, 2024	<u>\$ -</u>	<u>\$ 82</u>	<u>\$ -</u>	<u>\$ 82</u>

The severance and other costs detailed above have been included as a component of other operating expenses, and all inventory-related charges are included in cost of revenues.

8. Employee Benefit Plans

Employee Retirement Savings Plans

The Company sponsors various qualified employee retirement savings plans and makes contributions to match a certain portion of employee contributions. The Company contributed \$1.1 million to these plans for each of the years ended December 31, 2024 and 2023.

Employee Pension Plans

The Company's subsidiary in the United Kingdom, Biochrom Ltd., maintains defined benefit pension plans for its employees. In 2014, these defined benefit pension plans were closed to new employees, as well as closed to the future accrual of benefits for existing employees. The Company recognizes the funded status of the pension plans as an asset or liability in the consolidated balance sheets. The funded status equals the difference between the fair value of the plan's assets and their benefit obligations and has historically been measured each year as of December 31st. The Company records net period benefit expense (credit) as a component of other expense in the Consolidated Statement of Operations.

The components of the Company's net period benefit expense for the years ending December 31, 2024 and 2023, were as follows:

	Year Ended December 31,	
	2024	2023
(in thousands)		
Interest cost	\$ 667	\$ 670
Expected return on plan assets	(887)	(788)
Net amortization loss	408	328
Net periodic benefit expense	<u>\$ 188</u>	<u>\$ 210</u>

The following provides a reconciliation of the changes in the plans' fair value of assets and benefit obligations for the years ended December 31, 2024 and 2023, and a summary of the funded status as of December 31, 2024 and 2023:

	December 31,	
	2024	2023
(in thousands)		
Change in fair value of plan assets:		
Balance at beginning of year	\$ 16,940	\$ 15,576
Actual return on plan assets	(1,520)	351
Employer contributions	575	622
Benefits paid	(565)	(563)
Currency translation adjustment	(251)	954
Balance at end of year	<u>\$ 15,179</u>	<u>\$ 16,940</u>

	December 31,	
	2024	2023
(in thousands)		
Change in benefit obligation:		
Balance at beginning of year	\$ 14,663	\$ 13,263
Interest cost	662	665
Actuarial (gain) loss	(1,760)	479
Benefits paid	(565)	(563)
Currency translation adjustment	(211)	819
Balance at end of year	<u>\$ 12,789</u>	<u>\$ 14,663</u>

	December 31,	
	2024	2023
(in thousands)		
Fair value of plan assets	\$ 15,179	\$ 16,940
Benefit obligation	12,789	14,663
Net funded status	<u>\$ 2,390</u>	<u>\$ 2,277</u>

Changes in the actuarial (gain) loss disclosed above are primarily the result of changes in the discount rate and inflation assumptions due to underlying market conditions.

The amounts recognized in the consolidated balance sheets consist of:

(in thousands)	December 31,	
	2024	2023
Other long-term assets	\$ 2,390	\$ 2,277
Accumulated other comprehensive loss	6,143	5,909

The weighted average assumptions used in determining the net pension cost for these plans follows:

	December 31,	
	2024	2023
Discount rate	5.5%	4.6%
Expected return on assets	5.5%	5.3%

The discount rate assumptions used for pension accounting reflect the prevailing rates available on high-quality, fixed-income debt instruments with terms that match the average expected duration of the Company's defined benefit pension plan obligations.

The Company's mix of pension plan investments among asset classes also affects the long-term expected rate of return on plan assets. As of December 31, 2024, the Company's actual asset mix approximated its target mix. Differences between actual and expected returns are recognized in the calculation of net periodic pension cost over the average remaining expected future working lifetime, which is approximately 12 years for active plan participants.

The asset allocations and fair value of the Company's pension benefits as of December 31, 2024 and 2023, were as follows:

(in thousands)	December 31,			
	2024		2023	
Asset category:				
Debt securities	\$ 12,310	81%	\$ 11,761	69%
Insurance contracts	1,461	10%	-	0%
Equity securities	712	5%	3,567	21%
Cash and cash equivalents	402	3%	304	2%
Other	294	2%	1,308	8%
Total	\$ 15,179	100%	\$ 16,940	100%

(in thousands)	December 31,	
	2024	2023
Quoted prices in active markets for identical assets (Level 1)	\$ 402	\$ 304
Significant other observable inputs (Level 2)	14,777	16,636
Significant other unobservable inputs (Level 3)	-	-
Total	\$ 15,179	\$ 16,940

Level 1 assets consist of cash and cash equivalents held in the pension plans. The Level 2 assets primarily consist of investments in private investment funds that are valued using the net asset values provided by the trust or fund, including an insurance contract. Although these funds are not traded in an active market with quoted prices, the investments underlying the net asset value are based on quoted prices.

The Company expects to contribute approximately \$0.3 million to its pension plan during 2025. The benefits expected to be paid from the pension plans are \$0.8 million in 2025, \$0.7 million in 2026, \$0.7 million in 2027, \$0.8 million in 2028, and \$0.9 million in 2029. The expected benefits to be paid in the five years from 2030 to 2034 are \$4.4 million. The expected benefits are based on the same assumptions used to measure the Company's benefit obligation at December 31, 2024.

9. Leases

The Company has non-cancelable operating leases for office space, manufacturing facilities, warehouse space, automobiles and equipment expiring at various dates through 2030.

The components of lease expense for the years ended December 31, 2024 and 2023, were as follows:

	Year Ended December 31,	
	2024	2023
(in thousands)		
Operating lease cost	\$ 2,049	\$ 2,013
Short-term lease cost	191	199
Sublease income	(68)	(102)
Total lease cost	<u>\$ 2,172</u>	<u>\$ 2,110</u>

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

	December 31,	
	2024	2023
(in thousands)		
Operating lease right-of-use assets	<u>\$ 6,132</u>	<u>\$ 4,773</u>
Current portion, operating lease liabilities	\$ 1,158	\$ 1,416
Operating lease liabilities, long-term	<u>6,381</u>	<u>4,794</u>
Total operating lease liabilities	<u>\$ 7,539</u>	<u>\$ 6,210</u>
Weighted average remaining lease term (years)	5.2	5.7
Weighted average discount rate	8.9%	9.5%

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

	Year Ended December 31,	
	2024	2023
(in thousands)		
Cash paid for amounts included in the measurement of lease liabilities	\$ 2,186	\$ 2,367
Right-of-use assets obtained in exchange for lease obligations	2,945	293

Future minimum lease payments for operating leases, with initial terms in excess of one year at December 31, 2024, are as follows:

Year Ending December 31,	
(in thousands)	
2025	\$ 1,783
2026	1,802
2027	1,779
2028	1,770
2029	1,575
Thereafter	<u>833</u>
Total lease payments	<u>9,542</u>
Less imputed interest	<u>(2,003)</u>
Total operating lease liabilities	<u>\$ 7,539</u>

10. Debt

As of December 31, 2024 and 2023, the Company's debt was as follows:

(in thousands)	December 31, 2024	December 31, 2023
Debt:		
Term loan	\$ 24,700	\$ 30,723
Revolving line	12,650	6,400
Less: unamortized deferred financing costs	(394)	(560)
Total debt	36,956	36,563
Less: current portion of long-term debt	(37,350)	(6,139)
Current unamortized deferred financing costs	394	280
Long-term debt	\$ -	\$ 30,704

The Company maintains a Credit Agreement (as amended, the "Credit Agreement") with Citizens Bank, N.A., Wells Fargo Bank, National Association, and First Citizens Bank & Trust Company (together, the "Lenders"). The Credit Agreement provides for a term loan of \$40.0 million and a \$25.0 million revolving credit facility (including a \$10.0 million sub-facility for the issuance of letters of credit and a \$10.0 million swingline loan sub facility) (collectively, the "Credit Facility"). The Company's obligations under the Credit Agreement are secured by substantially all of the assets of Harvard Bioscience, Inc., including all or a portion of the equity interests in certain of the Company's domestic and foreign subsidiaries. The Company's obligations under the Credit Agreement are guaranteed by certain of the Company's direct, domestic wholly owned subsidiaries; none of the Company's direct or indirect foreign subsidiaries has guaranteed the Credit Facility. Issuance costs of \$1.6 million are amortized over the contractual term to maturity date on a straight-line basis, which approximates the effective interest method. Total revolver borrowing capacity is limited by the consolidated net leverage ratio as defined under the amended Credit Agreement. As of the date of this report, the Company is unable to make additional borrowings under its revolving credit facility due to net leverage ratio requirements set forth in the August 6, 2024 amendment to the Credit Agreement (the "August 2024 Amendment") and the terms of the March 10, 2025 amendment to the Credit Agreement (the "March 2025 Amendment"), as described below.

Borrowings under the Credit Facility will, at the option of the Company, bear interest at either (i) a rate per annum based on the Secured Overnight Financing Rate ("SOFR") for an interest period of one, two, three or six months, plus an applicable interest rate margin determined as provided in the Credit Agreement (a "SOFR Loan"), subject to a floor of 0.50%, or (ii) an alternative base rate plus an applicable interest rate margin, each as determined as provided in the Credit Agreement (an "ABR Loan"). The alternative base rate is based on the Citizens Bank prime rate or the federal funds effective rate of the Federal Reserve Bank of New York and is subject to a floor of 1.0%. Pursuant to the August 2024 Amendment, the applicable interest rate margin varies from 2.0% per annum to 3.75% per annum for SOFR Loans, and from 1.5% per annum to 3.5% per annum for ABR Loans, in each case depending on the Company's consolidated net leverage ratio and is determined in accordance with a pricing grid set forth in the Credit Agreement, as amended. There are no prepayment penalties in the event the Company elects to prepay and terminate the Credit Facility prior to its scheduled maturity date, subject to SOFR Loan breakage and redeployment costs in certain circumstances.

The effective interest rate on the Company's borrowings for both of the years ended December 31, 2024 and 2023, was 8.1%. The weighted average interest rate as of December 31, 2024, net of the effect of the Company's interest rate swap agreement, was 8.4%. 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 December 31, 2024, the term loan requires quarterly installment payments of \$1.0 million with a balloon payment at maturity on December 22, 2025. Furthermore, within ninety days after the end of the Company's fiscal year, the term loan may be permanently reduced pursuant to certain mandatory prepayment events including an annual "excess cash flow sweep", as defined in the Credit Agreement, provided that, in any fiscal year, any voluntary prepayments of the term loan shall be credited against the Company's "excess cash flow" prepayment obligations on a dollar-for-dollar basis for such fiscal year. There is no excess cash flow sweep requirement for the year ended December 31, 2024. As of December 31, 2023, the current portion of long-term debt included amounts due under the excess cash flow sweep of \$2.0 million which was paid on March 29, 2024. Amounts outstanding under the revolving credit facility can be repaid at any time but are due in full at maturity.

The Credit Agreement includes various customary financial covenants and other affirmative and negative covenants binding on the Company. The negative covenants limit the ability of the Company, among other things, to incur debt, permit liens, make investments, sell assets, or pay dividends on its capital stock. The financial covenants include a maximum consolidated net leverage ratio and a minimum consolidated fixed charge coverage ratio. The Credit Agreement also includes customary events of default.

In March 2024, the Company entered into an amendment to the Credit Agreement pursuant to which the Lenders and administrative agent modified the definition of Consolidated EBITDA used in the calculation of certain financial covenants to adjust for charges related to an abandoned property audit (see Note 13) and commission fees in connection with ERTC filings (see Note 5).

In August 2024, the Company entered into an amendment to the Credit Agreement that, among other things, modified the financial covenants relating to the consolidated net leverage ratio and consolidated fixed charge coverage ratio through the period ended December 31, 2024. The amendment also added a net leverage ratio requirement with respect to additional borrowing under the Company's revolving credit facility and restrictions on certain additional indebtedness and investments. In addition, the applicable interest rate margin was increased by 50bps during such time as the Company's consolidated net leverage ratio is greater than 3.0. The Company paid fees of \$0.2 million to the Lenders in connection with the amendment.

The Company was not in compliance with the consolidated net leverage ratio covenant contained in the Credit Agreement as of the December 31, 2024 test date. On March 10, 2025, the Company entered into the March 2025 Amendment pursuant to which the lenders and administrative agent agreed to waive such non-compliance subject to the terms contained in the March 2025 Amendment. The March 2025 Amendment provides, among other things, that the lender's commitment under the Company's revolving credit facility is capped at the amount outstanding thereunder as of the date thereof and thus the Company is unable to make additional borrowings under the revolving credit facility. The March 2025 Amendment also provides that the Company's failure to achieve certain refinancing milestones, including receipt of a term sheet or commitment letter from one or more potential lenders, by the dates provided in the March 2025 Amendment or the Company's failure to consummate a refinancing of the Credit Agreement by June 30, 2025, would, in either case, constitute an event of default under the Credit Agreement. The lenders also agreed not to assert the financial covenants for the first quarter of fiscal year 2025 provided that the Company continues to comply with its payment obligations, achieves the refinancing milestones, provides the administrative agent with certain financial reports and maintains a minimum level of liquidity as defined by the March 2025 Amendment. If the Company is not able to comply with the terms and conditions of the March 2025 Amendment, or if the Company is otherwise unable to regain and maintain compliance with the covenants under the Credit Agreement, as amended, or are unsuccessful in obtaining waivers or amendments for any covenant in the future, in addition to other actions the Company's lenders may require, the amounts outstanding under the Credit Agreement may become immediately due and payable. The Company paid fees of \$0.1 million to the Lenders in connection with the March 2025 Amendment.

If the Company is not able to comply with the terms and conditions of the March 2025 Amendment, or if the Company is otherwise unable to regain and maintain compliance with the covenants under the Credit Agreement, as amended, or are unsuccessful in obtaining waivers or amendments for any covenant in the future, in addition to other actions the lenders may require, the amounts outstanding under the Credit Agreement may become immediately due and payable.

11. Derivatives

In February 2023, the Company entered into an interest rate swap contract to improve the predictability of cash flows from interest payments related to its variable, SOFR-based debt. The swap contract had a notional amount of \$21.7 million as of December 31, 2024, and matures on December 22, 2025. This swap contract effectively converts the SOFR-based variable portion of the interest payable under the Credit Agreement into fixed-rate debt at an annual rate of 4.75%. The swap contract does not impact the additional interest related to the applicable interest rate margin as discussed above in Note 10, Debt. The swap contract is considered an effective cash flow hedge, and as a result, net gains or losses are reported as a component of other comprehensive income ("OCI") in the consolidated financial statements and are reclassified when the underlying hedged interest impacts earnings. An assessment is performed quarterly to evaluate the ongoing hedge effectiveness.

The following table presents the notional amount and fair value of the Company's derivative instrument as of December 31, 2024 and 2023:

(in thousands)		December 31, 2024		December 31, 2023	
Derivatives Instruments	Balance Sheet Classification	Notional Amount	Fair Value (a)	Notional Amount	Fair Value (a)
Interest rate swap	Other current liabilities	\$ 21,658	\$ (99)	\$ -	\$ -
Interest rate swap	Other long-term liabilities	-	-	27,375	(199)

(a) See Note 13 for the fair value measurements related to this financial instrument.

The following table summarizes the effect of derivatives designated as cash flow hedging instruments for the years ended December 31, 2024 and 2023:

Derivatives Qualifying as Hedges, net of tax (in thousands)	December 31, 2024	December 31, 2023
Gain (loss) recognized in OCI on derivatives (effective portion)	\$ 100	\$ (199)
Amounts reclassified from AOCI to interest expense	136	120

12. Marketable Equity Securities

In April 2023, the Company received shares of common stock of Harvard Apparatus Regenerative Technology, Inc. ("HRGN", formerly known as Biostage, Inc.) in connection with settlement of indemnification obligations related to litigation which was resolved during the year ended December 31, 2022. As of December 31, 2023, these shares had an estimated fair value \$3.5 million and are included in the consolidated balance sheet as a component of other long-term assets. For the year ended December 31, 2023, the Company recognized a loss on equity securities of \$0.6 million. During the year ended December 31, 2024, the Company sold its HRGN shares for \$1.9 million and recorded a loss on equity securities of \$1.6 million.

13. Fair Value Measurements

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

Assets (Liabilities) (in thousands)	Fair Value as of December 31, 2024			
	Level 1	Level 2	Level 3	Total
Interest rate swap agreement	\$ -	\$ (99)	\$ -	\$ (99)

	Fair Value as of December 31, 2023			
	Level 1	Level 2	Level 3	Total
Equity securities - common stock	\$ 3,511	\$ -	\$ -	\$ 3,511
Interest rate swap agreement	\$ -	\$ (199)	\$ -	\$ (199)

The Company uses the market approach technique to value its financial assets and liabilities. The Company's financial assets and liabilities carried at fair value include, when applicable, investments in common stock and derivative instruments used to hedge the Company's interest rate risks. The fair value of the Company's interest rate swap agreement was based on SOFR-yield curves at the reporting date. The fair value of the Company's investment in common stock of Harvard Apparatus Regenerative Technologies ("HRGN" formerly known as Biostage, Inc.) was based on the closing price as quoted on the OTCQB Marketplace at the reporting date.

14. Stock-Based Compensation

Stock-based compensation expense for the years ended December 31, 2024 and 2023, was allocated as follows:

(in thousands)	Year Ended December 31,	
	2024	2023
Cost of revenues	\$ 122	\$ 308
Sales and marketing expenses	599	746
General and administrative expenses	3,165	3,560
Research and development expenses	454	386
Total stock-based compensation	<u>\$ 4,340</u>	<u>\$ 5,000</u>

As of December 31, 2024, the total compensation costs related to unvested awards not yet recognized is \$4.1 million and the weighted average period over which it is expected to be recognized is approximately 1.6 years. During the years ended December 31, 2024 and 2023, the Company did not capitalize any stock-based compensation.

Equity Incentive Plans

During 2021, the Company's board of directors and stockholders adopted the 2021 Incentive Plan which authorized additional shares available for grants to officers, employees, non-employee directors and other key persons of the Company and its subsidiaries. As of December 31, 2024, there were approximately 2.4 million shares available for issuance under the 2021 Incentive Plan.

Restricted Stock Units with a Market Condition

The Company granted deferred awards of market condition restricted stock units (the "Market Condition RSUs") to certain members of the Company's management team. The vesting of the Market Condition RSUs is linked to the achievement of a relative total shareholder return ("TSR") of the Company's common stock measured from the earlier of (i) the measurement period as set out in the award agreement or (ii) upon a change of control (measured relative to the Nasdaq Biotechnology or Russell 2000 index and based on a 20-day trading average price) and is subject to a one-year holding period after vesting.

For Market Condition RSUs with a measurement period that concluded during the years ended December 31, 2024 and 2023, the TSR of the Company's common stock relative to the applicable index resulted in achieving a weighted average vesting of 21% and 100% of the target, respectively. Market Condition RSUs outstanding as of December 31, 2024 remain subject to a TSR measurement which can result in vesting rates ranging from 0% to 150% of the target number.

The weighted average assumptions used in the valuation of the Market Condition RSUs granted during the year ended December 31, 2023, are as follows:

Volatility	56.8%
Risk-free interest rate	4.6%
Correlation coefficient	41.7%
Dividend yield	-%
Liquidity discount	14.1%

The Company used historical volatility to calculate the expected volatility matching the expected holding period. The risk-free interest rate assumption is based upon observed U.S. Treasury bill interest rates (risk-free) corresponding with the requisite service period. Additionally, the Company assumes a liquidity discount to adjust the fair value for the one-year holding period post-vest restrictions.

Restricted Stock Units with a Performance Condition

Performance-based RSU awards are contingent on the achievement of certain performance metrics. Compensation cost associated with performance-based RSUs are recognized based on the estimated number of shares that the Company ultimately expects will be earned. If the estimated number of shares to be earned is revised in the future, then stock-based compensation expense will be adjusted accordingly.

Stock-Based Payment Awards

Restricted stock unit (“RSU”) activity for the years ended December 31, 2024 and 2023, was as follows:

	Time-Based		Market-Based		Performance-Based	
	Restricted Stock Units	Grant Date Fair Value	Restricted Stock Units	Grant Date Fair Value	Restricted Stock Units	Grant Date Fair Value
Balance at December 31, 2022	1,093,801	\$ 3.94	646,235	\$ 4.51	-	\$ -
Granted	1,350,125	2.87	558,958	2.61	-	-
Vested	(1,144,065)	3.38	(316,210)	4.01	-	-
Cancelled/Forfeited	(134,865)	3.71	(87,138)	4.64	-	-
Balance at December 31, 2023	1,164,996	\$ 3.28	801,845	\$ 3.37	-	\$ -
Granted	1,078,213	3.85	-	-	375,895	4.19
Vested	(717,119)	3.62	(51,732)	3.30	-	-
Forfeited	(147,095)	3.60	(191,155)	5.60	-	-
Balance at December 31, 2024	1,378,995	\$ 3.51	558,958	\$ 2.61	375,895	\$ 4.19

The aggregate fair value of RSUs that vested during the years ended December 31, 2024, and 2023 was \$1.8 million and \$7.5 million, respectively. Unvested shares related to market-based and performance-based vesting conditions are reflected at 100% of their target vesting amount in the table above. Actual vesting could range from zero to 150% of their target amounts.

Stock option activity for the years ended December 31, 2024 and 2023, was as follows:

	Number of Options	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term	Aggregate Intrinsic Value (in thousands)
Outstanding at December 31, 2022	1,238,776	\$ 3.15		
Exercised	(213,644)	2.38		
Cancelled/Forfeited	(101,065)	2.71		
Outstanding and exercisable at December 31, 2023	924,067	\$ 3.37		
Exercised	(13,586)	3.18		
Cancelled/Forfeited	(83,023)	4.70		
Outstanding and exercisable at December 31, 2024	827,458	\$ 3.24	2.7	\$ -

There is no aggregate intrinsic value at December 31, 2024 because the Company’s closing stock price of \$2.11 is below the exercise price of the outstanding options. The aggregate intrinsic value of options exercised was nil and \$0.6 million for the years ended December 31, 2024 and 2023, respectively.

Employee Stock Purchase Plan (“ESPP”)

The Company has an employee stock purchase plan under which eligible employees may purchase a limited number of shares of common stock at a discount of up to 15% of the market value of such stock at pre-determined and plan-defined dates. There were 0.1 million and 0.2 million shares issued under the ESPP during the years ended December 31, 2024 and 2023, respectively. As of December 31, 2024, there were 0.1 million shares available for issuance under the ESPP.

15. Income Tax

Income tax expense for the years ended December 31, 2024 and 2023, consisted of:

(in thousands)	Year Ended December 31,	
	2024	2023
Current income tax expense:		
Federal and state	\$ 140	\$ 570
Foreign	290	61
	<u>430</u>	<u>631</u>
Deferred income tax (benefit) expense:		
Federal and state	(70)	132
Foreign	380	96
	<u>310</u>	<u>228</u>
Total income tax expense	<u>\$ 740</u>	<u>\$ 859</u>

The effective tax rate for the year ended December 31, 2024 was (6.3)% as compared with (33.5)% for the same period in 2023. The difference between the Company's effective tax rate year over year was primarily attributable to changes to tax attribute carryforwards, a decrease in the Company's GILTI inclusion, and a difference in the Company's excess tax benefits related to stock compensation.

Income tax expense for the years ended December 31, 2024 and 2023, differed from the amount computed by applying the U.S. federal income tax rate of 21% to pre-tax loss as a result of the following:

(in thousands)	Year Ended December 31,	
	2024	2023
Income tax benefit computed at federal statutory tax rate	\$ (2,450)	\$ (537)
Increase (decrease) in income taxes resulting from:		
Permanent differences, net	82	(89)
Non-deductible executive compensation	243	324
Global Intangible Low-Taxed Income (GILTI)	-	537
State income taxes, net of federal income tax benefit	(245)	(19)
Stock-based compensation	210	(329)
Tax credits	52	(51)
Net operating loss true-ups and expirations	(125)	1,140
Change in reserve for uncertain tax position	(233)	239
Impact of change to prior year tax accruals	398	(171)
Change in valuation allowance allocated to income tax	2,666	631
Other	142	(816)
Total income tax expense	<u>\$ 740</u>	<u>\$ 859</u>

Income tax expense was based on the following pre-tax (loss) income:

(in thousands)	Year Ended December 31,	
	2024	2023
Domestic	\$ (10,966)	\$ (2,951)
Foreign	(699)	395
Total	<u>\$ (11,665)</u>	<u>\$ (2,556)</u>

The tax effects of temporary differences that give rise to significant components of the deferred tax assets and deferred tax liabilities at December 31, 2024 and 2023, were as follows:

(in thousands)	Year Ended December 31,	
	2024	2023
Deferred income tax assets:		
Inventory	\$ 1,036	\$ 1,489
Operating loss and credit carryforwards	12,371	11,550
Research and development	4,776	3,908
Employee retention credit	1,409	1,435
Lease liabilities	1,675	1,317
Accrued expenses	472	818
Stock compensation	699	670
Deferred interest expense	1,023	386
Other assets	204	934
Total gross deferred assets	23,665	22,507
Less: valuation allowance	(17,769)	(15,222)
Deferred tax assets	\$ 5,896	\$ 7,285
Deferred income tax liabilities:		
Indefinite-lived intangible assets	\$ 1,990	\$ 1,964
Definite-lived intangible assets	2,468	3,733
Lease right-of-use assets	1,339	959
Employee benefit plans	597	569
Other liabilities	120	400
Total deferred tax liabilities	6,514	7,625
Deferred income tax liabilities, net	\$ (618)	\$ (340)

Deferred income tax assets and liabilities by classification on the consolidated balance sheets were as follows:

(in thousands)	Year Ended December 31,	
	2024	2023
Deferred tax assets (included in other long-term assets)	\$ 92	\$ 436
Deferred income tax liabilities	(710)	(776)
Deferred income tax liability, net	\$ (618)	\$ (340)

As of December 31, 2024, the Company had federal net operating loss carryforwards of \$1.3 million, state net operating loss carryforwards of \$8.4 million, and foreign net operating loss carryforwards of \$7.8 million. The federal and foreign net operating losses can be carried forward indefinitely while the state net operating losses expire between 2025 and 2044, all of which are partially offset by valuation allowances. The Company had \$7.6 million of federal research and development tax credit carryforwards which begin to expire in 2025 and are partially offset by a reserve of \$0.8 million for uncertain tax positions. The Company had a total of \$2.7 million of state investment tax credit carryforwards, research and development tax credit carryforwards, and enterprise zone credit carryforwards, which begin to expire in 2025 and are partially offset by a reserve of \$0.3 million for uncertain tax positions. In addition, the Company had a total of \$0.4 million of international R&D credits which begin to expire in 2037. The Internal Revenue Code ("IRC") limits the amounts of net operating loss carryforwards or credits that a company may use in any one year in the event of a change in ownership under IRC Sections 382 or 383. The Company completed a study through December 31, 2023 and determined that no Section 382 ownership changes occurred.

As of December 31, 2024 and 2023, the Company maintained a total valuation allowance of \$17.8 million and \$15.2 million, respectively, which related to foreign, federal, and state deferred tax assets in both years. The valuation allowance was based on estimates of taxable income in each of the jurisdictions in which the Company operates and the period over which deferred tax assets will be recoverable. The net change in the total valuation allowance for the years ended December 31, 2024 and 2023, was an increase of \$2.5 million and \$0.7 million, respectively. During the year ended December 31, 2024, the Company increased the valuation allowance related to the estimate of realizability of Spanish deferred tax assets and deferred tax assets related to the net operating losses and credit carryforwards generated in the current year.

As of December 31, 2024 and 2023, cash and cash equivalents held by the Company's foreign subsidiaries were \$2.7 million and \$2.1 million, respectively. As of December 31, 2024, the Company has determined the potential income tax and withholding liability related to available cash balances at foreign subsidiaries to be immaterial.

A summary of activity of unrecognized tax benefits is as follows:

(in thousands)	
Balance at December 31, 2022	\$ 1,983
Additions based on tax positions of prior years	13
Decreases based on tax positions of prior years	57
Additions based on tax positions of current year	245
Other decreases, net	(76)
Balance at December 31, 2023	2,222
Additions based on tax positions of prior years	172
Decreases based on tax positions of prior years	(382)
Additions based on tax positions of current year	111
Other decreases, net	(134)
Balance at December 31, 2024	<u>\$ 1,989</u>

The Company expects the amount of unrecognized tax benefits to change within the next twelve months, including the release of reserves of approximately \$0.2 million. Substantially all of the liability for uncertain tax benefits related to various federal, state and foreign income tax matters would benefit the Company's effective tax rate, if recognized. The Company classifies interest and penalties related to unrecognized tax benefits as a component of income tax expense, which has not been significant during the years ended December 31, 2024 and 2023, respectively.

With a few exceptions, the Company is no longer subject to income tax examinations by tax authorities in foreign jurisdictions for the years before 2020. In the U.S., the Company's net operating loss and tax credit carryforward amounts remain subject to federal and state examination for tax years starting in 2005 as a result of tax credits generated in the prior years. There are currently no pending federal or state tax examinations.

16. Commitments and Contingent Liabilities

The Company is involved in various claims and legal proceedings arising in the ordinary course of business. After consultation with legal counsel, the Company has determined that the ultimate disposition of such proceedings is not likely to have a material adverse effect on its business, financial condition, results of operations or cash flow. Although unfavorable outcomes in the proceedings are possible, the Company has not accrued loss contingencies relating to any such matters as they are not considered to be probable and reasonably estimable. If one or more of these matters are resolved in a manner adverse to the Company, the impact on the Company's business, financial condition, results of operations and cash flows could be material.

In addition, the Company has entered into indemnification agreements with its directors and officers. It is not possible to determine the maximum potential liability amount under these indemnification agreements due to the limited history of prior indemnification claims and the unique facts and circumstances involved in each particular agreement. The Company has not recorded any liability for costs related to contingent indemnification obligations as of December 31, 2024.

The Company is subject to unclaimed property laws in the ordinary course of its business. State escheat laws generally require entities to report and remit abandoned and unclaimed property to the state. Failure to timely report and remit the property can result in assessments that could include interest and penalties, in addition to the payment of the escheat liability itself. The Company recorded an expense of \$0.3 million during the year ended December 31, 2024, related to the completion of unclaimed property audits which have been included in other operating expenses in the consolidated statement of operations.

17. Product Line Disposition

In February 2023, the Company completed the disposition of its Hoefer product line for cash consideration of \$0.5 million. The carrying value of assets sold was \$0.1 million resulting in a gain on disposition of \$0.4 million which is recorded in other (expense) income, net, in the consolidated statement of operations for the year ended December 31, 2023. Revenue and gross profit of this disposed product line included in the condensed consolidated statement of operations for the year ended December 31, 2023 were not significant.

18. Government Assistance

As there is no authoritative guidance under U.S. GAAP on accounting for grants to for profit business entities from government entities, the Company accounts for government assistance by analogy to International Accounting Standards Topic 20, *Accounting for Government Grants and Disclosure of Government Assistance* (IAS 20). Under IAS 20, government grants are recognized when there is reasonable assurance that the grant will be received and that all conditions related to the grant will be met. Grants related to income are presented as part of the consolidated statements of operations either as a deduction of the related expense or reported separately in other income. The Company recognizes government assistance that supplements salaries or research activities as a reduction of the related operating expense over the period for which it is intended to compensate. Government assistance that is not directly related to expense reimbursement or relates to costs incurred in a previous fiscal period is recorded as other income.

The Coronavirus Aid, Relief, and Economic Security Act of 2020 (“CARES Act”) provided an employee retention tax credit (“ERTC”) that was a refundable tax credit against certain employer taxes. The Company elected to account for the credit as a government grant. The Company received ERTC refunds of \$3.2 million during the year ended December 31, 2024. Due to the subjectivity of the credit, the Company has included the refunds received in other current liabilities in the consolidated balance sheet as of December 31, 2024, subject to a determination that the refunds are recognizable. The Company engaged a professional services firm under a commission fee arrangement to assist with determining the Company’s eligibility to claim the ERTC refunds and accumulating the necessary support that was used as a basis in the filing. During the year ended December 31, 2024, the Company paid fees of \$0.5 million for these services, which are included in other operating expenses in the consolidated statement of operations. In January 2025, the Company received an additional \$1.0 million of ERTC refunds.

For the years ended December 31, 2024 and 2023, the Company received \$0.5 million and \$0.2 million, respectively, under other government assistance programs. The majority of the assistance was a result of the Company’s German subsidiaries participating in programs established to offset the costs of qualifying research and development activities and employee training.

19. Segment Information

The Company conducts business as a single operating segment which is based upon the Company’s organizational and management structure, as well as information used by the CODM to allocate resources and other factors. The accounting policies of the segment are the same as those described in Note 2.

The key measure of segment profitability that the CODM uses to allocate resources and assess performance is consolidated net income (loss), as reported on the consolidated statements of operations. The CODM utilizes consolidated net loss by comparing actual results against budgeted amounts on a quarterly basis. The following table presents the significant revenue and expense categories of the Company’s single operating segment:

	Year Ended December 31,	
	2024	2023
Revenues	\$ 94,135	\$ 112,250
Less:		
Cost of revenues (1)	39,247	45,871
Sales and marketing expenses (1)	21,613	23,362
General and administrative expenses (1)	18,328	19,149
Research and development expenses (1)	9,952	11,378
Amortization of acquired intangibles	5,255	5,525
Interest expense	3,209	3,591
Income tax expense	740	859
Other segment expenses (2)	8,196	5,930
Net loss	<u>\$ (12,405)</u>	<u>\$ (3,415)</u>

(1) Excludes stock-based compensation expense

(2) Includes stock-based compensation, other operating expenses, loss on equity securities and other expense

Asset information provided to the CODM is consistent with that reported on the consolidated balance sheets with particular emphasis on the Company's available liquidity, including its cash, accounts receivable, and inventory, reduced by current liabilities. Information relating to the Company's products and services and geographical distribution of revenues is disclosed in Note 3.

20. Subsequent Event

On March 10, 2025, the Company entered into the March 2025 Amendment to the Credit Agreement as described in Note 10 – Debt.

EXHIBIT INDEX

The following exhibits are filed as part of this Annual Report on Form 10-K. Where such filing is made by incorporation by reference to a previously filed document, such document is identified.

Exhibit	Description	Method of Filing
2.1§	Separation and Distribution Agreement between Harvard Bioscience, Inc. and Biostage, Inc. (f/k/a Harvard Apparatus Regenerative Technology, Inc.) dated as of October 31, 2013.	Exhibit to the Current Report on Form 8-K filed November 6, 2013, and incorporated by reference thereto.
3.1	Second Amended and Restated Certificate of Incorporation of Harvard Bioscience, Inc.	Exhibit to the Registration Statement on Form S-1/A (File No. 333-45996) (filed November 9, 2000) and incorporated by reference thereto.
3.2	Amended and Restated By-laws of Harvard Bioscience, Inc.	Exhibit to the Registration Statement on Form S-1/A (File No. 333-45996) (filed November 9, 2000) and incorporated by reference thereto.
3.3	Amendment No. 1 to Amended and Restated Bylaws of Harvard Bioscience, Inc. (as adopted October 30, 2007).	Exhibit to the Current Report on Form 8-K (filed November 1, 2007) and incorporated by reference thereto.
4.1	Specimen certificate for shares of Common Stock, \$0.01 par value, of Harvard Bioscience, Inc.	Exhibit to the Registration Statement on Form S-1/A (File No. 333-45996) (filed November 9, 2000) and incorporated by reference thereto.
4.2	Description of Securities.	Exhibit to the Annual Report on Form 10-K (filed March 16, 2020) and incorporated by reference thereto.
10.1 #	Harvard Bioscience, Inc. Fourth Amended and Restated 2000 Stock Option and Incentive Plan.	Exhibit to the Quarterly Report on Form 10-Q filed August 10, 2020, and incorporated by reference thereto.
10.2	Harvard Bioscience, Inc. Employee Stock Purchase Plan, as amended.	Disclosed as Appendix A to the Proxy Statement on Schedule 14A filed April 7, 2022, and incorporated by reference thereto.
10.3	Form of Director Indemnification Agreement.	Exhibit to the Quarterly Report on Form 10-Q filed May 8, 2020, and incorporated by reference thereto.
10.4 +	Trademark License Agreement, dated December 19, 2002, by and between Harvard Bioscience, Inc. and President and Fellows of Harvard College.	Exhibit to the Annual Report on Form 10-K filed March 9, 2023, and incorporated by reference thereto.
10.5 #	Form of Incentive Stock Option Agreement (Executive Officers).	Exhibit to the Annual Report on Form 10-K filed March 16, 2006, and incorporated by reference thereto.
10.6 #	Form of Non-Qualified Stock Option Agreement (Executive Officers).	Exhibit to the Annual Report on Form 10-K filed March 16, 2006, and incorporated by reference thereto.

10.7 #	Form of Non-Qualified Stock Option Agreement (Non-Employee Directors).	Exhibit to the Annual Report on Form 10-K filed March 16, 2006, and incorporated by reference thereto.
10.8 #	Form of Deferred Stock Award Agreement.	Exhibit to the Annual Report on Form 10-K filed March 16, 2011, and incorporated by reference thereto.
10.9 #	Form of Market Condition Deferred Stock Award Agreement.	Exhibit to the Annual Report on Form 10-K filed March 16, 2020, and incorporated by reference thereto.
10.10 #	Employment Agreement between Harvard Bioscience, Inc. and James Green.	Exhibit to the Current Report on Form 8-K filed July 8, 2019, and incorporated by reference thereto.
10.11#	Employment Agreement between Harvard Bioscience, Inc. and Jennifer Cote dated June 19, 2023	Exhibit to the Current Report on Form 8-K filed June 20, 2023, and incorporated by reference thereto.
10.12	Credit Agreement dated as of December 22, 2020 among Harvard Bioscience, Inc., as borrower, the lenders party thereto, and Citizens Bank, N.A., as administrative agent.	Exhibit to the Current Report on Form 8-K filed December 23, 2020, and incorporated by reference thereto.
10.13	Pledge and Security Agreement dated as of December 22, 2020 among Harvard Bioscience, Inc., certain of Harvard Bioscience's direct and indirect subsidiaries and Citizens Bank, N.A., as administrative agent.	Exhibit to the Current Report on Form 8-K filed December 23, 2020, and incorporated by reference thereto.
10.14	First Amendment to Credit Agreement and Amendment to Pledge and Security Agreement, dated April 28, 2022, among Harvard Bioscience, Inc., Citizens Bank, N.A., as the administrative agent, and the lenders party thereto.	Exhibit to the Current Report on Form 8-K filed April 28, 2022, and incorporated by reference thereto.
10.15	Second Amendment to Credit Agreement and Amendment to Pledge and Security Agreement, dated November 8, 2022, among Harvard Bioscience, Inc., Citizens Bank, N.A., as the administrative agent, and the lenders party thereto.	Exhibit to the Form 10-Q filed November 9, 2022, and incorporated by reference thereto.
10.16	Guarantee Agreement dated as of December 22, 2020 among Harvard Bioscience, Inc., certain of Harvard Bioscience's direct and indirect subsidiaries and Citizens Bank, N.A., as administrative agent.	Exhibit to the Current Report on Form 8-K filed December 23, 2020, and incorporated by reference thereto.
10.17	Third Amendment to Credit Agreement dated March 28, 2024, among Harvard Bioscience, Inc., Citizen Bank, N. A., as the administrative agent, and the lenders party thereto.	Exhibit to the Current Report on Form 8-K on April 3, 2024, and incorporated by reference thereto.
10.18	Fourth Amendment to Credit Agreement dated August 6, 2024, among Harvard Bioscience, Inc., Citizen Bank, N. A., as the administrative agent, and the lenders party thereto.	Exhibit to the Form 10-Q filed August 8, 2024, and incorporated by reference thereto.
10.19	Fifth Amendment to Credit Agreement dated March 10, 2025, among Harvard Bioscience, Inc., Citizen Bank, N. A., as the administrative agent, and the lenders party thereto.	Exhibit to the Current Report on Form 8-K filed March 12, 2025, and incorporated by reference thereto.
10.20#	Harvard Bioscience, Inc. 2021 Incentive Plan.	Exhibit to the Current Report on Form 8-K filed May 19, 2021, and incorporated by reference thereto.
10.21#	Form of Performance RSU Award Agreement - 2021 Incentive Plan.	Exhibit to the Annual Report on Form 10-K filed March 11, 2022, and incorporated by reference thereto.

10.22#	Form of Time-Based RSU Awards Agreement – 2021 Incentive Plan.	Exhibit to the Annual Report on Form 10-K filed March 11, 2022, and incorporated by reference thereto.
10.23#	Form of RSU Award for Directors – 2021 Incentive Plan.	Exhibit to the Annual Report on Form 10-K filed March 11, 2022, and incorporated by reference thereto.
10.24#	Form of Time-Based Restricted Stock Unit Award Agreement -2021 Incentive Plan (for awards granted on or after March 5, 2024)	Exhibit to the Form 10-Q filed August 8, 2024, and incorporated by reference thereto.
10.25#	Form of Performance-Based Restricted Stock Unit Award Agreement -2021 Incentive Plan (for awards granted on or after March 5, 2024)	Exhibit to the Form 10-Q filed August 8, 2024, and incorporated by reference thereto.
10.26#	Form of Director and Officer Indemnification Agreement	Exhibit to the Form 10-Q filed August 8, 2024, and incorporated by reference thereto.
19	Insider Trading Policy	Filed with this report
21.1	Subsidiaries of the Registrant	Filed with this report
23.1	Consent of Grant Thornton LLP	Filed with this report
31.1	Certification of Chief Financial Officer of Harvard Bioscience, Inc., pursuant to Rules 13a-15(e) and 15d-15(e), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002	Filed with this report
31.2	Certification of Chief Executive Officer of Harvard Bioscience, Inc., pursuant to Rules 13a-15(e) and 15d-15(e), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002	Filed with this report
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	*
97	Harvard Bioscience Inc., Dodd-Frank Clawback Policy	Exhibit to the Annual Report on Form 10-K filed March 7, 2024, and incorporated by reference thereto.
101.INS	Inline XBRL Instance Document	Filed with this report
101.SCH	Inline XBRL Taxonomy Extension Schema Document	Filed with this report
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document	Filed with this report
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document	Filed with this report
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document	Filed with this report
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document	Filed with this report
104	Cover Page Interactive Data File (formatted as Inline XBRL with applicable taxonomy extension information contained in Exhibits 101)	

- + Portions of this exhibit have been redacted in compliance with Item 601(b)(10) of Regulation S-K.
- * 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
- # Management contract or compensatory plan or arrangement.
- § The schedules and exhibits have been omitted. A copy of any omitted schedule or exhibit will be furnished to the SEC supplementally upon request.

The Company will furnish to stockholders a copy of any exhibit without charge upon written request.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

HARVARD BIOSCIENCE, INC.

Date: March 13, 2025

By: /s/ JAMES GREEN

James Green

Chief Executive Officer

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ JAMES GREEN</u> James Green	Chief Executive Officer and Director (Principal Executive Officer)	March 13, 2025
<u>/s/ JENNIFER COTE</u> Jennifer Cote	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	March 13, 2025
<u>/s/ KATHERINE A. EADE</u> Katherine A. Eade	Director	March 13, 2025
<u>/s/ ALAN EDRICK</u> Alan Edrick	Director	March 13, 2025
<u>/s/ THOMAS W. LOEWALD</u> Thomas W. Loewald	Director	March 13, 2025
<u>/s/ BERTRAND LOY</u> Bertrand Loy	Director	March 13, 2025