

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**
Washington, DC 20549

FORM 8-K

CURRENT REPORT

**Pursuant to Section 13 or 15(d) of the
Securities Exchange Act of 1934**

**October 18, 2018
Date of Report (date of earliest event reported)**

OpGen, Inc.
(Exact name of Registrant as specified in its charter)

**Delaware
(State or other jurisdiction of
incorporation or organization)**

**001-37367
(Commission
File Number)**

**06-1614015
(I.R.S. Employer
Identification Number)**

**708 Quince Orchard Road, Suite 205
Gaithersburg, MD 20878
(Address of principal executive offices, including zip code)**

**(240) 813-1260
(Registrant's telephone number, including area code)**

**Not Applicable
(Former name or former address, if changed since last report)**

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions (see General Instruction A.2. below):

- Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)
 Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)
 Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))
 Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (§230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§240.12b-2 of this chapter).

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.

Item 1.01 Entry into a Material Definitive Agreement.

On October 18, 2018, OpGen, Inc. (the “Company”) entered into an underwriting agreement (the “Underwriting Agreement”) with Aegis Capital Corp., as the underwriter (the “Underwriter”), relating to the firm-commitment underwritten public offering of 2,220,000 shares of the Company’s common stock, par value \$0.01 per share (the “Shares”), at a public offering price of \$1.45 per share (the “Offering”). The Company also granted the Underwriter an option for a period of 45 days to purchase up to an additional 330,751 shares of common stock to cover over-allotments, if any, at the public offering price, less the underwriting discount. The Offering is scheduled to close on October 22, 2018, subject to customary closing conditions.

The Offering is being made pursuant to the Company’s Registration Statement on Form S-3 (File No. 333-213356) previously filed with and declared effective by the Securities and Exchange Commission.

The Underwriting Agreement contains customary representations, warranties and covenants of the Company. It also provides for customary indemnification by each of the Company and the Underwriter for losses or damages arising out of or in connection with the Offering. In addition, pursuant to the terms of the Underwriting Agreement, each director and executive officer of the Company entered into an agreement with the Underwriter not to sell, transfer or otherwise dispose of securities of the Company for 90 days after the date of the final prospectus supplement, subject to certain exceptions.

The Underwriter will receive discounts and commissions of six percent (6%) of the gross cash proceeds received by the Company from the sale of the Shares in the Offering, and up to \$45,000 for its out of pocket expenses, which includes fees of counsel to the Underwriter, subject to compliance with FINRA Rule 5110(f)(2)(D). The Company expects to receive approximately \$2.8 million, or approximately \$3.3 million if the Underwriter exercise its option to purchase additional shares in full, in net proceeds from the Offering after deducting the underwriting discount and estimated offering expenses payable by the Company.

The foregoing description of the Underwriting Agreement does not purport to be complete and is qualified in its entirety by reference to the full text of the Underwriting Agreement, a copy of which is attached hereto as Exhibit 1.1 and is incorporated by reference into this Item 1.01. A copy of the opinion of Ballard Spahr LLP, as legal counsel to the Company, relating to the legality of the issuance and sale of the Shares in the Offering is attached hereto as Exhibit 5.1.

Item 8.01 Other Events.

On October 17, 2018, the Company issued a press release announcing the launch of the Offering. A copy of the press release is attached as Exhibit 99.1 and is incorporated herein by reference.

On October 18, 2018, the Company issued a press release announcing the pricing of the Offering of the Shares. A copy of the press release is attached as Exhibit 99.2 and is incorporated herein by reference.

Item 9.01 Financial Statements and Exhibits.

(d) Exhibits.

[1.1 Underwriting Agreement, dated October 18, 2018, by and between OpGen, Inc. and Aegis Capital Corp.](#)

[5.1 Opinion of Ballard Spahr LLP](#)

[23.1 Consent of Ballard Spahr LLP \(contained in legal opinion filed herewith as Exhibit 5.1\)](#)

[99.1 Press Release, dated October 17, 2018, issued by OpGen, Inc.](#)

[99.2 Press Release, dated October 18, 2018, issued by OpGen, Inc.](#)

SIGNATURES

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

OpGen, Inc.

By: /s/ Timothy C. Dec

Name: Timothy C. Dec

Title: Chief Financial Officer

Date: October 18, 2018

OPGEN, INC.
UNDERWRITING AGREEMENT
2,220,000 Shares of Common Stock

October 18, 2018

Aegis Capital Corp.
As the Representative of the
Several Underwriters Named on Schedule I hereto
810 7th Avenue, 18th Floor
New York, NY 10019

Ladies and Gentlemen:

OpGen, Inc., a Delaware corporation (the “Company”), proposes, subject to the terms and conditions stated herein, to issue and sell to the underwriters named in **Schedule I** hereto (the “Underwriters,” or each, an “Underwriter”), for whom Aegis Capital Corp. is acting as the representative (the “Representative”), an aggregate of 2,220,000 authorized but unissued shares (the “Firm Shares”) of common stock, par value \$0.01 per share (the “Common Stock”), of the Company. The Company also proposes to sell to the Underwriters, upon the terms and conditions set forth in Section 4 hereof, up to an additional 330,751 shares of Common Stock (the “Option Shares”). The Firm Shares and the Option Shares are hereinafter collectively referred to as the “Shares”. The Shares are also referred to as the “Securities.”

The Company and the several Underwriters hereby confirm their agreement as follows:

1. Registration Statement and Prospectus.

The Company has prepared and filed with the Securities and Exchange Commission (the “Commission”) a registration statement on Form S-3 (File No. 333-213356) under the Securities Act of 1933, as amended (the “Securities Act”), and the rules and regulations (the “Rules and Regulations”) of the Commission thereunder relating to the Securities and such amendments to such registration statement (including post effective amendments) as may have been required to the date of this Agreement. Such registration statement, as amended (including any post effective amendments), has been declared effective by the Commission. The registration statement, together with the amendments prior to the date of this Agreement, including the information (if any) deemed to be a part of, or incorporated by reference into, the registration statement at the time of effectiveness pursuant to Rule 430A or Rule 430B under the Securities Act, or at such time as the case may be, is hereinafter referred to as the “Registration Statement” and the related prospectus, dated August 26, 2016, included in the Registration Statement at the time the Registration Statement first became effective is hereinafter called the “Base Prospectus”. If the Company has filed or files an abbreviated registration statement pursuant to Rule 462(b) under the Securities Act (the “Rule 462 Registration Statement”), then any reference herein to the term Registration Statement shall include such Rule 462 Registration Statement.

The Company is filing with the Commission pursuant to Rule 424 under the Securities Act a final prospectus supplement to the Base Prospectus relating to the Securities. The final prospectus supplement as filed, along with the Base Prospectus, is hereinafter called the “Final Prospectus.” The term “Preliminary Prospectus” means the Base Prospectus, together with any preliminary prospectus supplement used or filed with the Commission pursuant to Rule 424 of the Rules and Regulations, in the form provided to the Underwriters by the Company for use in connection with the offering of the Securities. Such Final Prospectus and any Preliminary Prospectus in the form in which they shall be filed with the Commission pursuant to Rule 424(b) under the Securities Act (including the Base Prospectus as so supplemented) is hereinafter called a “Prospectus.” Reference made herein to the Base Prospectus, any Preliminary Prospectus or to the Prospectus shall be deemed to refer to and include any documents incorporated by reference therein and any reference to any amendment or supplement to the Base Prospectus, any Preliminary Prospectus or the Prospectus shall be deemed to refer to and include any document filed under the Securities Exchange Act of 1934, as amended (the “Exchange Act”), and the rules and regulations of the Commissions thereunder, incorporated by reference in such Preliminary Prospectus or the Prospectus, as the case may be. The term “Effective Date” shall mean each date that the Registration Statement and any post-effective amendment or amendments thereto became or become effective.

The Commission has not notified the Company of any objection to the use of form of Registration Statement or any post-effective amendment thereto.

2. ***Representations and Warranties of the Company Regarding the Offering.***

(a) The Company represents and warrants to, and agrees with, the several Underwriters, as of the date hereof, and as of the Closing Date (as defined in Section 4(d) below) and as of each Option Closing Date (as defined in Section 4(b) below), if any, as follows:

(i) **No Material Misstatements or Omissions.** At each time of effectiveness, at the date hereof, at the Closing Date, and at each Option Closing Date, if any, the Registration Statement and any post-effective amendment thereto complied or will comply in all material respects with the requirements of the Securities Act and the Rules and Regulations and did not, does not, and will not, as the case may be, contain any untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein not misleading. The Time of Sale Disclosure Package (as defined in Section 2(a)(v)(A)(1) below) as of 8:00a.m. (Eastern time) (the “Applicable Time”) on the date hereof, and at the Closing Date and on each Option Closing Date, if any, and the Final Prospectus, as amended or supplemented, as of its date, at the time of filing pursuant to Rule 424(b) under the Securities Act, and at the Closing Date and at each Option Closing Date, if any, and any individual Written Testing-the-Waters Communication, when considered together with the Time of Sale Disclosure Package, did not, does not and will not contain any untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading. The representations and warranties set forth in the two immediately preceding sentences shall not apply to statements in or omissions from the Registration Statement, the Time of Sale Disclosure Package or any Prospectus in reliance upon, and in conformity with, written information furnished to the Company by any Underwriter specifically for use in the preparation thereof. The Registration Statement contains all exhibits and schedules required to be filed by the Securities Act or the Rules and Regulations. No order of the Commission preventing or suspending the effectiveness or use of the Registration Statement or any Prospectus is in effect and no proceedings by the Commission for such purpose have been instituted or are pending, or, to the knowledge of the Company, are contemplated or threatened by the Commission.

(ii) **Marketing Materials.** The Company has not distributed any prospectus or other offering material in connection with the offering and sale of the Securities other than the Time of Sale Disclosure Package and the roadshow or investor presentations delivered to and approved by the Representative for use in connection with the marketing of the offering of the Securities (the “Marketing Materials”).

(iii) **Testing-the-Waters Communications.** The Company (i) has not alone engaged in any Testing-the-Waters Communication and (ii) has not authorized anyone to engage in Testing-the-Waters Communications. The Company has not distributed any Testing-the-Waters Communication that is a written communication within the meaning of Rule 405 under the Securities Act (“Written Testing-the-Waters Communications”). “Testing-the-Waters Communication” means any oral or written communication with potential investors undertaken in reliance on Section 5(d) of the Securities Act.

(iv) **Accurate Disclosure.** (A) The Company has provided a copy to the Underwriters of each Issuer Free Writing Prospectus (as defined below) used in the sale of Securities. The Company has filed all Issuer Free Writing Prospectuses required to be so filed with the Commission, and no order preventing or suspending the effectiveness or use of any Issuer Free Writing Prospectus is in effect and no proceedings for such purpose have been instituted or are pending, or, to the knowledge of the Company, are contemplated or threatened by the Commission. When taken together with the rest of the Time of Sale Disclosure Package or the Final Prospectus, no Issuer Free Writing Prospectus, as of its issue date and at all subsequent times through the completion of the public offer and sale of Securities, has, does or will contain (1) any untrue statement of a material fact or omission to state any material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading, or (2) information that conflicted, conflicts or will conflict with the information contained in the Registration Statement or the Final Prospectus. The representations and warranties set forth in the immediately preceding sentence shall not apply to statements in or omissions from the Time of Sale Disclosure Package, the Final Prospectus or any Issuer Free Writing Prospectus in reliance upon, and in conformity with, written information furnished to the Company by any Underwriter specifically for use in the preparation thereof, which written information is described in Section 7(f). As used in this paragraph and elsewhere in this Agreement:

(1) “Time of Sale Disclosure Package” means the Base Prospectus, the Prospectus most recently filed with the Commission before the time of this Agreement, including any preliminary prospectus supplement deemed to be a part thereof, each Issuer Free Writing Prospectus, and the description of the transaction provided by the Underwriters included on **Schedule II**.

(2) “Issuer Free Writing Prospectus” means any “issuer free writing prospectus,” as defined in Rule 433 under the Securities Act, relating to the Securities that (A) is required to be filed with the Commission by the Company, or (B) is exempt from filing pursuant to Rule 433(d)(5)(i) or (d)(8) under the Securities Act, in each case in the form filed or required to be filed with the Commission or, if not required to be filed, in the form retained in the Company’s records pursuant to Rule 433(g) under the Securities Act.

(B) At the time of filing of the Registration Statement and at the date hereof, the Company was not and is not an “ineligible issuer,” as defined in Rule 405 under the Securities Act or an “excluded issuer” as defined in Rule 164 under the Securities Act.

(C) Each Issuer Free Writing Prospectus listed on Schedule III satisfied, as of its issue date and at all subsequent times through the Prospectus Delivery Period, all other conditions as may be applicable to its use as set forth in Rules 164 and 433 under the Securities Act, including any legend, record-keeping or other requirements.

(v) **Financial Statements.** The financial statements of the Company, together with the related notes and schedules, included or incorporated by reference in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus comply in all material respects with the applicable requirements of the Securities Act and the Securities Exchange Act of 1934, as amended (the “Exchange Act”), and the rules and regulations of the Commission thereunder, and fairly present in all material respects the financial condition of the Company as of and at the dates indicated and the results of operations and changes in cash flows for the periods therein specified in conformity with U.S. generally accepted accounting principles (“GAAP”) consistently applied throughout the periods involved (provided that unaudited interim financial statements are subject to year-end audit adjustments that are not expected to be material in the aggregate and do not contain all footnotes required by GAAP). No other financial statements or schedules are required under the Securities Act, the Exchange Act, or the Rules and Regulations to be included or incorporated by reference in the Registration Statement, the Time of Sale Disclosure Package or the Final Prospectus.

(vi) **Independent Accountants.** To the Company’s knowledge, CohnReznick LLP, which has expressed its opinion with respect to the financial statements and schedules incorporated by reference as a part of the Registration Statement and incorporated by reference in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus, is an independent registered public accounting firm with respect to the Company within the meaning of the Securities Act and the Rules and Regulations.

(vii) **Accounting and Disclosure Controls.** The Company and its subsidiaries maintain systems of “internal control over financial reporting” (as defined under Rules 13a-15 and 15d-15 under the Exchange Act) that comply with the requirements of the Exchange Act and have been designed by, or under the supervision of, their respective principal executive and principal financial officers, or persons performing similar functions, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with GAAP, including, but not limited to, internal accounting controls sufficient to provide reasonable assurance that (i) transactions are executed in accordance with management’s general or specific authorizations; (ii) transactions are recorded as necessary to permit preparation of financial statements in conformity with GAAP and to maintain asset accountability; (iii) access to assets is permitted only in accordance with management’s general or specific authorization; (iv) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action is taken with respect to any differences; and (v) the interactive data in eXtensible Business Reporting Language included or incorporated by references in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus fairly present the information called for in all material respects and are prepared in accordance with the Commission’s rules and guidelines applicable thereto. Since the date of the latest audited financial statements included in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus, there has been no change in the Company’s internal control over financial reporting that has materially affected, or is reasonably likely to materially affect, the Company’s internal control over financial reporting.

The Company maintains disclosure controls and procedures that have been designed to ensure that material information relating to the Company and any subsidiaries is made known to the Company’s principal executive officer and principal financial officer by others within those entities; and such disclosure controls and procedures are effective.

(viii) **Forward-Looking Statements.** The Company had a reasonable basis for, and made in good faith, each “forward-looking statement” (within the meaning of Section 27A of the Securities Act or Section 21E of the Exchange Act) contained or incorporated by reference in the Registration Statement, the Time of Sale Disclosure Package, the Final Prospectus or the Marketing Materials.

(ix) **Statistical and Marketing-Related Data.** All statistical or market-related data included or incorporated by reference in the Registration Statement, the Time of Sale Disclosure Package or the Final Prospectus, or included in the Marketing Materials, are based on or derived from sources that the Company reasonably believes to be reliable and accurate, and the Company has obtained the written consent to the use of such data from such sources, to the extent required.

(x) **Trading Market.** The Common Stock is registered pursuant to Section 12(b) of the Exchange Act and is approved for listing on the Nasdaq Capital Market (the “Nasdaq”). Other than as set forth in the Company’s public filings with the Commission, there is no action pending by the Company or, to the Company’s knowledge, the Nasdaq to delist the Common Stock from the Nasdaq, nor has the Company received any notification that the Nasdaq is contemplating terminating such listing. When issued, the Shares will be listed on the Nasdaq.

(xi) **Absence of Manipulation.** The Company has not taken, directly or indirectly, any action that is designed to or that has constituted or that would reasonably be expected to cause or result in the stabilization or manipulation of the price of any security of the Company to facilitate the sale or resale of the Securities.

(xii) **Investment Company Act.** The Company is not and, after giving effect to the offering and sale of the Securities and the application of the net proceeds thereof, will not be an “investment company,” as such term is defined in the Investment Company Act of 1940, as amended.

3. Representations and Warranties Regarding the Company.

(a) The Company represents and warrants to, and agrees with, the several Underwriters, as of the date hereof and as of the Closing Date and as of each Option Closing Date, if any, as follows:

(i) **Good Standing.** Each of the Company and its subsidiaries has been duly organized and is validly existing as a corporation or other entity in good standing under the laws of its jurisdiction of incorporation. Each of the Company and its subsidiaries has the power and authority (corporate or otherwise) to own its properties and conduct its business as currently being carried on and as described in the Registration Statement, the Time of Sale Disclosure Package and the Prospectus, and is duly qualified to do business as a foreign corporation or other entity in good standing in each jurisdiction in which it owns or leases real property or in which the conduct of its business makes such qualification necessary, except where the failure to so qualify would not have or be reasonably likely to result in a material adverse effect upon the business, prospects, properties, operations, condition (financial or otherwise) or results of operations of the Company and its subsidiaries, taken as a whole, or in its ability to perform its obligations under this Agreement (“Material Adverse Effect”).

(ii) **Authorization.** The Company has the power and authority to enter into this Agreement and to authorize, issue and sell the Shares as contemplated by this Agreement. This Agreement has been duly authorized by the Company, and when executed and delivered by the Company, and will constitute the valid, legal and binding obligation of the Company, enforceable against the Company in accordance with its terms, except as rights to indemnity hereunder may be limited by federal or state securities laws and except as such enforceability may be limited by bankruptcy, insolvency, reorganization or similar laws affecting the rights of creditors generally and subject to general principles of equity or as rights to indemnification and contribution hereunder may be limited by applicable law or public policy.

(iii) **Contracts.** The execution, delivery and performance of this Agreement and the consummation of the transactions herein contemplated will not (A) result in a breach or violation of any of the terms and provisions of, or constitute a default under, any law, order, rule or regulation to which the Company or any subsidiary is subject, or by which any property or asset of the Company or any subsidiary is bound or affected, except to the extent that such conflict, default, or Default Acceleration Event is not reasonably likely to result in a Material Adverse Effect, (B) conflict with, result in any violation or breach of, or constitute a default (or an event that with notice or lapse of time or both would become a default) under, or give to others any right of termination, amendment, acceleration or cancellation (with or without notice, lapse of time or both) (a “Default Acceleration Event”) of, any agreement, lease, credit facility, debt, note, bond, mortgage, indenture or other instrument (the “Contracts”) or obligation or other understanding to which the Company or any subsidiary is a party or by which any property or asset of the Company or any subsidiary is bound or affected, except to the extent that such conflict, default, or Default Acceleration Event not reasonably likely to result in a Material Adverse Effect, or (C) result in a breach or violation of any of the terms and provisions of, or constitute a default under, the Company’s Certificate of Incorporation or by-laws.

(iv) **No Violations of Governing Documents.** Neither the Company nor any of its subsidiaries is in violation, breach or default under its certificate of incorporation, by-laws or other equivalent organizational or governing documents.

(v) **Consents.** No consents, approvals, orders, authorizations or filings are required on the part of the Company in connection with the execution, delivery or performance of this Agreement and the issue and sale of the Securities, except (A) the registration under the Securities Act of the Securities, which has been effected, (B) the necessary filings and approvals from the Nasdaq to list the Securities, (C) such consents, approvals, authorizations, registrations or qualifications as may be required under state or foreign securities or Blue Sky laws and the rules of the Financial Industry Regulatory Authority, Inc. (“FINRA”) in connection with the purchase and distribution of the Securities by the several Underwriters, (D) such consents and approvals as have been obtained and are in full force and effect, and (E) such consents, approvals, orders, authorizations and filings the failure of which to make or obtain is not reasonably likely to result in a Material Adverse Effect.

(vi) **Capitalization.** The Company has an authorized capitalization as set forth in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus. All of the issued and outstanding shares of capital stock of the Company are duly authorized and validly issued, fully paid and nonassessable, and have been issued in compliance with all applicable securities laws, and conform to the description thereof in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus. All of the issued shares of capital stock of each subsidiary of the Company have been duly and validly authorized and issued, are fully paid and non-assessable and, except as set forth in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus, are owned directly or indirectly by the Company, free and clear of all liens, encumbrances, equities or claims. Except for the issuances of options or restricted stock in the ordinary course of business, since the respective dates as of which information is provided in the Registration Statement, the Time of Sale Disclosure Package or the Final Prospectus, the Company has not entered into or granted any convertible or exchangeable securities, options, warrants, agreements, contracts or other rights in existence to purchase or acquire from the Company any shares of the capital stock of the Company. The Shares, when issued and paid for as provided herein, will be duly authorized and validly issued, fully paid and nonassessable, and will be free of preemptive, registration or similar rights—and will conform to the description of the capital stock of the Company contained in the Registration Statement, the Time of Sale Disclosure Package and the Prospectus.

(vii) **Taxes.** Each of the Company and its subsidiaries has (a) filed all foreign, federal, state and local tax returns (as hereinafter defined) required to be filed with taxing authorities prior to the date hereof or has duly obtained extensions of time for the filing thereof (except where the failure to file would not, individually or in the aggregate, have a Material Adverse Effect) and (b) paid all taxes (as hereinafter defined) shown as due and payable on such returns that were filed and has paid all taxes imposed on or assessed against the Company or such respective subsidiary (except for cases in which the failure to pay would not reasonably be likely to have a Material Adverse Effect). The provisions for taxes payable, if any, shown on the financial statements included or incorporated by reference in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus are sufficient for all accrued and unpaid taxes, whether or not disputed, and for all periods to and including the dates of such consolidated financial statements. To the knowledge of the Company, no issues have been raised (and are currently pending) by any taxing authority in connection with any of the returns or taxes asserted as due from the Company or its subsidiaries, and no waivers of statutes of limitation with respect to the returns or collection of taxes have been given by or requested from the Company or its subsidiaries. The term “taxes” mean all federal, state, local, foreign, and other net income, gross income, gross receipts, sales, use, ad valorem, transfer, franchise, profits, license, lease, service, service use, withholding, payroll, employment, excise, severance, stamp, occupation, premium, property, windfall profits, customs, duties or other taxes, fees, assessments, or charges of any kind whatever, together with any interest and any penalties, additions to tax, or additional amounts with respect thereto. The term “returns” means all returns, declarations, reports, statements, and other documents required to be filed in respect to taxes.

(viii) **Material Change.** Since the respective dates as of which information is given (including information incorporated by reference) in the Registration Statement, the Time of Sale Disclosure Package or the Final Prospectus, (a) neither the Company nor any of its subsidiaries has incurred any material liabilities or obligations, direct or contingent, or entered into any material transactions other than in the ordinary course of business, (b) the Company has not declared or paid any dividends or made any distribution of any kind with respect to its capital stock; (c) there has not been any change in the capital stock of the Company or any of its subsidiaries (other than a change in the number of outstanding shares of Common Stock due to the issuance of shares upon the exercise of outstanding options or warrants, upon the conversion of outstanding shares of preferred stock or other convertible securities or the issuance of restricted stock awards or restricted stock units under the Company’s existing stock awards plan, or any new grants thereof in the ordinary course of business), (d) there has not been any material change in the Company’s long-term or short-term debt, and (e) there has not been the occurrence of any Material Adverse Effect.

(ix) **Absence of Proceedings.** There is not pending or, to the knowledge of the Company, threatened, any action, suit or proceeding to which the Company or any of its subsidiaries is a party or of which any property or assets of the Company or any of its subsidiaries is the subject before or by any court or governmental agency, authority or body, or any arbitrator or mediator, which is reasonably likely to result in a Material Adverse Effect.

(x) **Permits.** The Company and each of its subsidiaries, as applicable, holds, and is in compliance with, all franchises, grants, authorizations, licenses, permits, easements, consents, certificates and orders ("Permits") of any governmental or self-regulatory agency, authority or body (including, without limitation, those administered by the Food and Drug Administration of the U.S. Department of Health and Human Services (the "FDA") or by any foreign, federal, state or local governmental or regulatory authority performing functions similar to those performed by the FDA) required for the conduct of its business, and all such Permits are in full force and effect, in each case except where the failure to hold, or comply with, any of them is not reasonably likely to result in a Material Adverse Effect or adversely affect the consummation of the transactions contemplated by this Agreement.

(xi) **Good Title.** The Company and each of its subsidiaries have good and marketable title to all property (whether real or personal) described in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus as being owned by them that are material to the business of the Company, in each case free and clear of all liens, claims, security interests, other encumbrances or defects, except those that are disclosed in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus and those that are not reasonably likely to result in a Material Adverse Effect. The property held under lease by the Company and its subsidiaries is held by them under valid, subsisting and enforceable leases with only such exceptions with respect to any particular lease as do not interfere in any material respect with the conduct of the business of the Company and its subsidiaries.

(xii) **Intellectual Property.** The Company and each of its subsidiaries owns or possesses or has valid right to use all patents, patent applications, trademarks, service marks, trade names, trademark registrations, service mark registrations, copyrights, licenses, inventions, trade secrets and similar rights ("Intellectual Property") necessary for the conduct of the business of the Company and its subsidiaries as currently carried on and as described in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus. To the knowledge of the Company, no action or use by the Company or any of its subsidiaries involve or give rise to any infringement of, or license or similar fees for, any Intellectual Property of others, except where such action, use, license or fee is not reasonably likely to result in a Material Adverse Effect. The Company has not received any notice alleging any such infringement or fee. To the Company's knowledge, none of the technology employed by the Company or any subsidiary has been obtained or is being used by the Company or such subsidiary in violation of any contractual obligation binding on the Company or such subsidiary or, to the Company's knowledge, any of the officers, directors or employees of the Company or any subsidiary, or, to the Company's knowledge, otherwise in violation of the rights of any persons, except in each case for such violations as would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect.

(xiii) **Employment Matters.** There is (A) no unfair labor practice complaint pending against the Company, or any of its subsidiaries, nor to the Company's knowledge, threatened against it or any of its subsidiaries, before the National Labor Relations Board, any state or local labor relation board or any foreign labor relations board, and no grievance or arbitration proceeding arising out of or under any collective bargaining agreement is so pending against the Company or any of its subsidiaries, or, to the Company's knowledge, threatened against it and (B) no labor disturbance by the employees of the Company or any of its subsidiaries exists or, to the Company's knowledge, is imminent, and the Company is not aware of any existing or imminent labor disturbance by the employees of any of its or its subsidiaries, principal suppliers, manufacturers, customers or contractors, that could reasonably be expected, singularly or in the aggregate, to have a Material Adverse Effect. The Company is not aware that any key employee or significant group of employees of the Company or any subsidiary plans to terminate employment with the Company or any such subsidiary.

(xiv) **ERISA Compliance.** No "prohibited transaction" (as defined in Section 406 of the Employee Retirement Income Security Act of 1974, as amended, including the regulations and published interpretations thereunder ("ERISA"), or Section 4975 of the Internal Revenue Code of 1986, as amended from time to time (the "Code")) or "accumulated funding deficiency" (as defined in Section 302 of ERISA) or any of the events set forth in Section 4043(b) of ERISA (other than events with respect to which the thirty (30)-day notice requirement under Section 4043 of ERISA has been waived) has occurred or could reasonably be expected to occur with respect to any employee benefit plan of the Company or any of its subsidiaries which would reasonably be expected to, singularly or in the aggregate, have a Material Adverse Effect. Each employee benefit plan of the Company or any of its subsidiaries is in compliance in all material respects with applicable law, including ERISA and the Code. The Company and its subsidiaries have not incurred and could not reasonably be expected to incur liability under Title IV of ERISA with respect to the termination of, or withdrawal from, any pension plan (as defined in ERISA). Each pension plan for which the Company or any of its subsidiaries would have any liability that is intended to be qualified under Section 401(a) of the Code is so qualified, and to the Company's knowledge nothing has occurred, whether by action or by failure to act, which could, singularly or in the aggregate, cause the loss of such qualification.

(xv) **Environmental Matters.** The Company and its subsidiaries are in compliance with all foreign, federal, state and local rules, laws and regulations relating to the use, treatment, storage and disposal of hazardous or toxic substances or waste and protection of health and safety or the environment which are applicable to their businesses ("Environmental Laws"), except where the failure to comply has not had and would not reasonably be expected to have, singularly or in the aggregate, a Material Adverse Effect. There has been no storage, generation, transportation, handling, treatment, disposal, discharge, emission, or other release of any kind of toxic or other wastes or other hazardous substances by, due to, or caused by the Company or any of its subsidiaries upon any of the property now or previously owned or leased by the Company or any of its subsidiaries, or upon any other property, in violation of any law, statute, ordinance, rule, regulation, order, judgment, decree or permit or which would, under any law, statute, ordinance, rule (including rule of common law), regulation, order, judgment, decree or permit, give rise to any liability, except for any violation or liability which has not had and would not reasonably be expected to have, singularly or in the aggregate, a Material Adverse Effect.

(xvi) **SOX Compliance.** The Company is in compliance in all material respects with all applicable provisions of the Sarbanes-Oxley Act of 2002 and all rules and regulations promulgated thereunder or implementing the provisions thereof.

(xvii) **Money Laundering Laws.** The operations of the Company and its subsidiaries are and have been conducted at all times in compliance with applicable financial recordkeeping and reporting requirements of the Currency and Foreign Transactions Reporting Act of 1970, as amended, the money laundering statutes of all jurisdictions, the rules and regulations thereunder and any related or similar rules, regulations or guidelines, issued, administered or enforced by any Governmental Entity (collectively, the “Money Laundering Laws”); and no action, suit or proceeding by or before any Governmental Entity involving the Company or any of its subsidiaries with respect to the Money Laundering Laws is pending or, to the knowledge of the Company, threatened. “Governmental Entity” shall be defined as any arbitrator, court, governmental body, regulatory body, administrative agency or other authority, body or agency (whether foreign or domestic) having jurisdiction over the Company or any of its subsidiaries or any of their respective properties, assets or operations.

(xviii) **Foreign Corrupt Practices Act.** Neither the Company, nor any of its subsidiaries, nor, to the knowledge of the Company, any director, officer, employee, representative, agent, affiliate of the Company or any of its subsidiaries or any other person acting on behalf of the Company or any of its subsidiaries, is aware of or has taken any action, directly or indirectly, that would result in a violation by such persons of the Foreign Corrupt Practices Act of 1977, as amended, and the rules and regulations thereunder (the “FCPA”), including, without limitation, making use of the mails or any means or instrumentality of interstate commerce corruptly in furtherance of an offer, payment, promise to pay or authorization of the payment of any money, or other property, gift, promise to give, or authorization of the giving of anything of value to any “foreign official” (as such term is defined in the FCPA) or any foreign political party or official thereof or any candidate for foreign political office, in contravention of the FCPA and the Company and, to the knowledge of the Company, its affiliates have conducted their businesses in compliance with the FCPA and have instituted and maintain policies and procedures designed to ensure, and which are reasonably expected to continue to ensure, continued compliance therewith.

(xix) **OFAC.** Neither the Company nor any of its subsidiaries or any director or officer of the Company or any subsidiary, nor, to the knowledge of the Company, any employee, representative, agent or affiliate of the Company or any of its subsidiaries or any other person acting on behalf of the Company or any of its subsidiaries is currently subject to any U.S. sanctions administered by the Office of Foreign Assets Control of the U.S. Treasury Department (“**OFAC**”); and the Company will not directly or indirectly use the proceeds of the offering of the Securities contemplated hereby, or lend, contribute or otherwise make available such proceeds to any person or entity, for the purpose of financing the activities of any person currently subject to any U.S. sanctions administered by OFAC.

(xx) **Insurance.** The Company and each of its subsidiaries carries, or is covered by, insurance in such amounts and covering such risks as is adequate for the conduct of its business and the value of its properties and as is customary for companies engaged in similar businesses in similar industries.

(xxi) **Books and Records.** The minute books of the Company and each of its subsidiaries have been made available to the Underwriters and counsel for the Underwriters, and such books accurately in all material respects reflect all transactions referred to in such minutes.

(xxii) **No Undisclosed Contracts.** There is no Contract or document required by the Securities Act or by the Rules and Regulations to be described in the Registration Statement, the Time of Sale Disclosure Package or in the Final Prospectus or to be filed as an exhibit to the Registration Statements which is not so described or filed therein as required; and all descriptions of any such Contracts or documents contained in the Registration Statement, the Time of Sale Disclosure Package and in the Final Prospectus are accurate and complete descriptions of such documents in all material respects. Other than as described in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus, no such Contract has been suspended or terminated for convenience or default by the Company or any subsidiary party thereto or, to the knowledge of the Company, any of the other parties thereto, and neither the Company nor any of its subsidiaries has received notice, and the Company has no knowledge, of any such pending or threatened suspension or termination, except for such pending or threatened suspensions or terminations that have not had, and would not reasonably be expected to have, a Material Adverse Effect, individually or in the aggregate.

(xxiii) **No Undisclosed Relationships.** No relationship, direct or indirect, exists between or among the Company or any of its subsidiaries on the one hand, and the directors, officers, stockholders (or analogous interest holders), customers or suppliers of the Company or any of its subsidiaries on the other hand, which is required to be described in the Registration Statement, the Time of Sale Disclosure Package or the Final Prospectus and which is not so described.

(xxiv) **Insider Transactions.** There are no outstanding loans, advances (except normal advances for business expenses in the ordinary course of business) or guarantees of indebtedness by the Company or any of its subsidiaries to or for the benefit of any of the officers or directors of the Company, any of its subsidiaries, or any of their respective family members, except as disclosed in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus. All transactions by the Company with office holders or control persons of the Company have been duly approved by the board of directors of the Company, or duly appointed committees or officers thereof, if and to the extent required under applicable law.

(xxv) **No Registration Rights.** No person or entity has the right to require registration of the Common Stock or other securities of the Company or any of its subsidiaries within 180 days of the date hereof because of the filing or effectiveness of the Registration Statement or otherwise, except for persons and entities who have expressly waived such right in writing or who have been given timely and proper written notice and have failed to exercise such right within the time or times required under the terms and conditions of such right. Except as described in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus, there are no persons with registration rights or similar rights to have any securities registered by the Company or any of its subsidiaries under the Securities Act.

(xxvi) **Continued Business.** No supplier, customer, distributor or sales agent of the Company or any subsidiary has notified the Company or any subsidiary that it intends to discontinue or decrease the rate of business done with the Company or any subsidiary, except where such discontinuation or decrease has not resulted in and could not reasonably be expected to result in a Material Adverse Effect.

(xxvii) **No Finder's Fee.** Except as disclosed to the Representative in writing, there are no claims, payments, issuances, arrangements or understandings for services in the nature of a finder's, consulting or origination fee with respect to the introduction of the Company to any Underwriter or the sale of the Securities hereunder or any other arrangements, agreements, understandings, payments or issuances with respect to the Company that may affect the Underwriters' compensation, as determined by FINRA.

(xxviii) **No Fees.** Except as disclosed to the Representative in writing, the Company has not made any direct or indirect payments (in cash, securities or otherwise) to (i) any person, as a finder's fee, investing fee or otherwise, in consideration of such person raising capital for the Company or introducing to the Company persons who provided capital to the Company, (ii) any FINRA member, or (iii) any person or entity that has any direct or indirect affiliation or association with any FINRA member within the 12-month period prior to the date on which the Registration Statement was filed with the Commission ("Filing Date") or thereafter.

(xxix) **Proceeds.** Except as disclosed to the Representative in writing, none of the net proceeds of the offering will be paid by the Company to any participating FINRA member or any affiliate or associate of any participating FINRA member, except as specifically authorized herein.

(xxx) **No FINRA Affiliations.** To the Company's knowledge, no (i) officer or director of the Company or its subsidiaries, (ii) owner of 5% or more of any class of the Company's securities or (iii) owner of any amount of the Company's unregistered securities acquired within the 180-day period prior to the Filing Date, has any direct or indirect affiliation or association with any FINRA member. The Company will advise the Representative and counsel to the Underwriters if it becomes aware that any officer, director of the Company or its subsidiaries or any owner of 5% or more of any class of the Company's securities is or becomes an affiliate or associated person of a FINRA member participating in the offering.

(xxxii) **No Financial Advisor.** Other than the Underwriters, no person has the right to act as an underwriter or as a financial advisor to the Company in connection with the transactions contemplated hereby.

(xxxiii) **Certain Statements.** The statements set forth in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus, insofar as they purport to describe the provisions of the laws and documents referred to therein, are accurate, complete and fair in all material respects, and under the caption “Description of Capital Stock” insofar as they purport to constitute a summary of (i) the terms of the Company’s outstanding securities, (ii) the terms of the Shares, and (iii) the terms of the documents referred to therein, are accurate, complete and fair in all material respects.

(xxxiiii) **Prior Sales of Securities.** Except as set forth in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus, the Company has not sold or issued any shares of Common Stock during the six-month period preceding the date hereof, including any sales pursuant to Rule 144A under, or Regulations D or S of, the Securities Act, other than shares issued pursuant to employee benefit plans, stock option plans or other employee compensation plans or pursuant to outstanding preferred stock, options, rights or warrants or other outstanding convertible securities.

(xxxv) **Certain Regulatory Matters.** The clinical, pre-clinical and other studies and tests conducted by or on behalf of or sponsored by the Company or its subsidiaries that are described or referred to in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus were and, if still pending, are being conducted in accordance in all material respects with all statutes, laws, rules and regulations, as applicable (including, without limitation, those administered by the FDA or by any foreign, federal, state or local governmental or regulatory authority performing functions similar to those performed by the FDA). The descriptions of the results of such studies and tests that are described or referred to in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus are accurate and complete in all material respects and fairly present the published data derived from such studies and tests, and each of the Company and its subsidiaries has no knowledge of other studies or tests the results of which are materially inconsistent with or otherwise call into question the results described or referred to in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus. Except as described in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus, neither the Company nor its subsidiaries has received any notices or other correspondence from the FDA or any other foreign, federal, state or local governmental or regulatory authority performing functions similar to those performed by the FDA with respect to any ongoing clinical or pre-clinical studies or tests requiring the termination or suspension of such studies or tests. For the avoidance of doubt, the Company makes no representation or warranty that the results of any studies, tests or preclinical or clinical trials conducted by or on behalf of the Company will be sufficient to obtain governmental approval from the FDA or any foreign, state or local governmental body exercising comparable authority. The Company has established and administers a compliance program applicable to the Company and its subsidiaries, to assist the Company, its subsidiaries and their directors, officers and employees of the Company and its subsidiaries in complying with applicable regulatory guidelines (including, without limitation, those administered by the FDA and any other foreign, federal, state or local governmental or regulatory authority performing functions similar to those performed by the FDA). Except as would not be reasonably expected to result in a Material Adverse Effect, neither the Company nor any of its subsidiaries has failed to file with the applicable regulatory authorities (excluding the FDA or any foreign, federal, state or local governmental or regulatory authority performing functions similar to those performed by the FDA) any filing, declaration, listing, registration, report or submission that is required to be so filed. Neither the Company nor any of its subsidiaries has failed to file with the FDA or any foreign, federal, state or local governmental or regulatory authority performing functions similar to those performed by the FDA, any filing, declaration, listing, registration, report or submission that is required to be so filed. All such filings were in material compliance with applicable laws when filed and no deficiencies have been asserted by any applicable regulatory authority (including, without limitation, the FDA or any foreign, federal, state or local governmental or regulatory authority performing functions similar to those performed by the FDA) with respect to any such filings, declarations, listings, registrations, reports or submissions.

(b) Any certificate signed by any officer of the Company and delivered to the Representative on behalf of the Underwriters or to counsel for the Underwriters shall be deemed a representation and warranty by the Company to the Underwriters as to the matters covered thereby.

4. Purchase, Sale and Delivery of Shares.

(a) On the basis of the representations, warranties and agreements herein contained, but subject to the terms and conditions herein set forth, the Company agrees to issue and sell the Firm Shares to the several Underwriters, and the several Underwriters agree, severally and not jointly, to purchase the Firm Shares set forth opposite the names of the Underwriters in Schedule I hereto. The purchase price for each Firm Share shall be \$1.45 per share. The purchase price to be paid by the Underwriters to the Company for each Firm Share shall be \$1.363 per share.

(b) The Company hereby grants to the Underwriters the option to purchase some or all of the Option Shares and, upon the basis of the warranties and representations and subject to the terms and conditions herein set forth, the Underwriters shall have the right, severally and not jointly, to purchase at the purchase price set forth in Section 4(a) all or any portion of the Option Shares as may be necessary to cover over-allotments made in connection with the transactions contemplated hereby. The purchase price to be paid by the Underwriters for the Option Shares shall be \$1.363 per share. This option may be exercised by the Representative at any time and from time to time on or before the forty-fifth (45th) day following the date hereof, by written notice to the Company (the “Option Notice”). The Option Notice shall set forth the aggregate number of Option Shares as to which the option is being exercised, and the date and time when the Option Shares are to be delivered (such date and time being herein referred to as the “Option Closing Date”); *provided, however*, that the Option Closing Date shall not be earlier than the Closing Date (as defined below) nor earlier than the first business day after the date on which the option shall have been exercised nor later than the fifth business day after the date on which the option shall have been exercised unless the Company and the Representative otherwise agree. If the Underwriters elect to purchase less than all of the Option Shares, the Company agrees to sell to each Underwriter the number of Option Shares obtained by multiplying the number of Option Shares specified in such notice by a fraction, the numerator of which is the number of Option Shares set forth opposite the name of the Underwriter in Schedule I hereto under the caption “Number of Option Shares to be Sold” and the denominator of which is the total number of Option Shares.

(c) Payment of the purchase price for and delivery of the Option Shares shall be made on an Option Closing Date in the same manner and at the same office as the payment for the Firm Shares as set forth in subparagraph (d) below.

(d) The Firm Shares will be delivered by the Company to the Representative, for the respective accounts of the several Underwriters, against payment of the purchase price therefor by wire transfer of same day funds payable to the order of the Company, at the offices of Aegis Capital Corp., 810 7th Avenue, 18th Floor, New York, NY 10019, or such other location as may be mutually acceptable, at 9:00 a.m. New York Time, on the third (or if the Firm Shares are priced, as contemplated by Rule 15c6-1(c) under the Exchange Act, after 4:30 p.m. Eastern time, the fourth) full business day following the date hereof, or at such other time and date as the Representative and the Company determine pursuant to Rule 15c6-1(a) under the Exchange Act, or, in the case of the Option Shares, at such date and time set forth in the Option Notice. The time and date of delivery of the Firm Shares is referred to herein as the “Closing Date.” On the Closing Date, the Company shall deliver the Firm Shares which shall be registered in the name or names and shall be in such denominations as the Representative may request on behalf of the Underwriters at least one (1) business day before the Closing Date, to the respective accounts of the several Underwriters, which delivery shall, with respect to the Firm Shares, be made through the facilities of the Depository Trust Company’s DWAC system.

(e) It is understood that the Representative has been authorized, for its own account and the accounts of the several Underwriters, to accept delivery of and receipt for, and make payment of the purchase price for the Firm Shares and any Option Shares the Underwriters have agreed to purchase. The Representative, individually and not as the Representative of the Underwriters, may (but shall not be obligated to) make payment for any Securities to be purchased by any Underwriter whose funds shall not have been received by the Representative by the Closing Date or any Option Closing Date, as the case may be, for the account of such Underwriter, but any such payment shall not relieve such Underwriter from any of its obligations under this Agreement.

5. **Covenants.**

(a) The Company covenants and agrees with the Underwriters as follows:

(i) The Company shall prepare the Final Prospectus in a form approved by the Representative and file such Final Prospectus pursuant to Rule 424(b) under the Securities Act not later than the Commission's close of business on the second business day following the execution and delivery of this Agreement, or, if applicable, such earlier time as may be required by the Rules and Regulations.

(ii) During the period beginning on the date hereof and ending on the later of the Closing Date or such date as determined by the Representative the Final Prospectus is no longer required by law to be delivered in connection with sales by an underwriter or dealer (the “Prospectus Delivery Period”), prior to amending or supplementing the Registration Statement, including any Rule 462 Registration Statement, the Time of Sale Disclosure Package or the Final Prospectus, the Company shall furnish to the Representative for review and comment a copy of each such proposed amendment or supplement, and the Company shall not file any such proposed amendment or supplement to which the Representative reasonably objects in writing.

(iii) From the date of this Agreement until the end of the Prospectus Delivery Period, the Company shall promptly advise the Representative in writing (A) of the receipt of any comments of, or requests for additional or supplemental information from, the Commission, (B) of the time and date of any filing of any post-effective amendment to the Registration Statement or any amendment or supplement to the Time of Sale Disclosure Package, the Final Prospectus or any Issuer Free Writing Prospectus, (C) of the time and date that any post-effective amendment to the Registration Statement becomes effective and (D) of the issuance by the Commission of any stop order suspending the effectiveness of the Registration Statement or of any order preventing or suspending its use or the use of the Time of Sale Disclosure Package, the Final Prospectus or any Issuer Free Writing Prospectus, or of any proceedings to remove, suspend or terminate from listing or quotation the Common Stock from any securities exchange upon which it is listed for trading or included or designated for quotation, or of the threatening or initiation of any proceedings for any of such purposes. If the Commission shall enter any such stop order at any time during the Prospectus Delivery Period, the Company will use its reasonable efforts to obtain the lifting of such order at the earliest possible moment. Additionally, the Company agrees that it shall comply with the provisions of Rules 424(b), 430A, 430B, or 430C, as applicable, under the Securities Act and will use its reasonable efforts to confirm that any filings made by the Company under Rule 424(b) or Rule 433 were received in a timely manner by the Commission (without reliance on Rule 424(b)(8) or 164(b) of the Securities Act).

(iv) (A) During the Prospectus Delivery Period, the Company will comply with all requirements imposed upon it by the Securities Act, as now and hereafter amended, and by the Rules and Regulations, as from time to time in force, and by the Exchange Act, as now and hereafter amended, so far as necessary to permit the continuance of sales of or dealings in the Securities as contemplated by the provisions hereof, the Time of Sale Disclosure Package, the Registration Statement and the Final Prospectus. If during the Prospectus Delivery Period any event occurs the result of which would cause the Final Prospectus (or if the Final Prospectus is not yet available to prospective purchasers, the Time of Sale Disclosure Package) to contain an untrue statement of a material fact or omit to state a material fact necessary to make the statements therein, in the light of the circumstances then existing, not misleading, or if during such period it is necessary or appropriate in the opinion of the Company or its counsel or the Representative or counsel to the Underwriters to amend the Registration Statement or supplement the Final Prospectus (or if the Final Prospectus is not yet available to prospective purchasers, the Time of Sale Disclosure Package) to comply with the Securities Act, or to file under the Exchange Act any document that would be deemed to be incorporated by reference in the Final Prospectus in order to comply with the Securities Act or the Exchange Act, the Company will promptly notify the Representative, allow the Representative the opportunity to provide reasonable comments on such amendment, prospectus supplement or document, and will amend the Registration Statement or supplement the Final Prospectus (or if the Final Prospectus is not yet available to prospective purchasers, the Time of Sale Disclosure Package) or file such document (at the expense of the Company) so as to correct such statement or omission or effect such compliance.

(B) If at any time during the Prospectus Delivery Period there occurred or occurs an event or development the result of which such Issuer Free Writing Prospectus conflicted or would conflict with the information contained in the Registration Statement or any Prospectus or included or would include, when taken together with the Time of Sale Disclosure Package, an untrue statement of a material fact or omitted or would omit to state a material fact necessary in order to make the statements therein, in the light of the circumstances prevailing at that subsequent time, not misleading, the Company will promptly notify the Representative and will promptly amend or supplement, at its own expense, such Issuer Free Writing Prospectus to eliminate or correct such conflict, untrue statement or omission.

(v) The Company shall take or cause to be taken all necessary action to qualify the Securities for sale under the securities laws of such jurisdictions as the Representative reasonably designates and to continue such qualifications in effect so long as required for the distribution of the Securities, except that the Company shall not be required in connection therewith to qualify as a foreign corporation or as a dealer in securities in any jurisdiction in which it is not so qualified, to execute a general consent to service of process in any state or to subject itself to taxation in respect of doing business in any jurisdiction in which it is not otherwise subject.

(vi) The Company will furnish to the Underwriters and counsel to the Underwriters a reasonable number of copies of the Registration Statement, each Prospectus, any Issuer Free Writing Prospectus, and all amendments and supplements to such documents, in each case as soon as available and in such quantities as the Underwriters may from time to time reasonably request.

(vii) The Company will make generally available to its security holders as soon as practicable, but in any event not later than 15 months after the end of the Company's current fiscal quarter, an earnings statement (which need not be audited) covering a 12-month period that shall satisfy the provisions of Section 11(a) of the Securities Act and Rule 158 of the Rules and Regulations.

(viii) The Company, whether or not the transactions contemplated hereunder are consummated or this Agreement is terminated, will pay or cause to be paid (A) all expenses (including transfer taxes allocated to the respective transferees) incurred by the Company in connection with the delivery to the Underwriters of the Securities (including all fees and expenses of the registrar and transfer agent of the Shares, and the cost of preparing and printing stock certificates), (B) all expenses and fees (including, without limitation, fees and expenses of the Company's counsel) in connection with the preparation, printing, filing, delivery, and shipping of the Registration Statement (including the financial statements therein and all amendments, schedules, and exhibits thereto), the Securities, the Time of Sale Disclosure Package, any Prospectus, the Final Prospectus, any Issuer Free Writing Prospectus and any amendment thereof or supplement thereto, (C) all reasonable filing fees and reasonable fees and disbursements of the Underwriters' counsel incurred in connection with the qualification of the Securities for offering and sale by the Underwriters or by dealers under the securities or blue sky laws of the states and other jurisdictions that the Representative shall designate, (D) the reasonable filing fees and reasonable fees and disbursements of counsel to the Underwriters incident to any required review and approval by FINRA, of the terms of the sale of the Securities, (F) listing fees, if any, and (G) all other costs and expenses incident to the performance of the Company's obligations hereunder that are not otherwise specifically provided for herein; provided, however, the costs and expenses described in the foregoing subsections (C) and (D) shall in no event exceed \$45,000 (inclusive of all reimbursable expenses of the Underwriting described in the immediately following sentence). The Company will reimburse the Representative for the Underwriters' reasonable out-of-pocket expenses, including legal fees and disbursements, in connection with the purchase and sale of the Securities contemplated hereby up to an aggregate of \$45,000 (including amounts payable pursuant to clauses (C) and (D) above). If this Agreement is terminated by the Representative in accordance with the provisions of Section 6 or Section 9, the Company will reimburse the Underwriters for all out-of-pocket disbursements (including, but not limited to, reasonable fees and disbursements of counsel, travel expenses, postage, facsimile and telephone charges) incurred by the Underwriter in connection with its investigation, preparing to market and marketing the Shares or in contemplation of performing its obligations hereunder.

(ix) The Company intends to apply the net proceeds from the sale of the Securities to be sold by it hereunder for the purposes set forth in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus under the heading "Use of Proceeds".

(x) The Company has not taken and will not take, directly or indirectly, during the Prospectus Delivery Period, any action designed to or which might reasonably be expected to cause or result in, or that has constituted, the stabilization or manipulation of the price of any security of the Company to facilitate the sale or resale of the Securities.

(xi) The Company represents and agrees that, unless it obtains the prior written consent of the Representative, and each Underwriter, severally, and not jointly, represents and agrees that, unless it obtains the prior written consent of the Company, it has not made and will not make any offer relating to the Securities that would constitute an Issuer Free Writing Prospectus; provided that the prior written consent of the parties hereto shall be deemed to have been given in respect of the free writing prospectuses included in **Schedule III**. Any such free writing prospectus consented to by the Company and the Representative is hereinafter referred to as a “Permitted Free Writing Prospectus.” The Company represents that it has treated or agrees that it will treat each Permitted Free Writing Prospectus as an “issuer free writing prospectus,” as defined in Rule 433, and has complied or will comply with the requirements of Rule 433 applicable to any Permitted Free Writing Prospectus, including timely Commission filing where required, legending and record-keeping.

(xii) The Company hereby agrees that, without the prior written consent of the Representative, it will not, during the period ending ninety (90) days after the date hereof (“Lock-Up Period”), (i) offer, pledge, issue, sell, contract to sell, purchase, contract to purchase, lend, or otherwise transfer or dispose of, directly or indirectly, any shares of Common Stock or any securities convertible into or exercisable or exchangeable for Common Stock; or (ii) enter into any swap or other arrangement that transfers to another, in whole or in part, any of the economic consequences of ownership of the Common Stock, whether any such transaction described in clause (i) or (ii) above is to be settled by delivery of Common Stock or such other securities, in cash or otherwise; or (iii) file any registration statement with the Commission relating to the offering of any shares of Common Stock or any securities convertible into or exercisable or exchangeable for Common Stock. The restrictions contained in the preceding sentence shall not apply to (1) the Securities to be sold hereunder, (2) the issuance of Common Stock upon the exercise of options or warrants or the conversion of outstanding preferred stock or other outstanding convertible securities disclosed as outstanding in the Registration Statement (excluding exhibits thereto), the Time of Sale Disclosure Package, and the Final Prospectus, or (3) the issuance of employee stock options not exercisable during the Lock-Up Period and the grant of restricted stock awards or restricted stock units or shares of Common Stock pursuant to equity incentive plans described in the Registration Statement (excluding exhibits thereto), the Time of Sale Disclosure Package, and the Final Prospectus.

(xiii) The Company hereby agrees, during a period of three years from the effective date of the Registration Statement, to furnish to the Representative copies of all reports or other communications (financial or other) furnished to shareholders, and to deliver to the Representative as soon as reasonably practicable upon availability, copies of any reports and financial statements furnished to or filed with the Commission or any national securities exchange on which any class of securities of the Company is listed; provided, that any information or documents available on the Commission’s Electronic Data Gathering, Analysis and Retrieval System shall be considered furnished for purposes of this Section 5(a)(xiii).

(xiv) The Company hereby agrees to engage and maintain, at its expense, a registrar and transfer agent for the Common Stock.

(xv) The Company hereby agrees to use its reasonable best efforts to obtain approval to list the Shares on the Nasdaq.

6. **Conditions of the Underwriter's Obligations.** The respective obligations of the several Underwriters hereunder to purchase the Shares are subject to the accuracy, as of the date hereof and at all times through the Closing Date, and on each Option Closing Date (as if made on the Closing Date or such Option Closing Date, as applicable), of and compliance with all representations, warranties and agreements of the Company contained herein, the performance by the Company of its obligations hereunder and the following additional conditions:

(a) If filing of the Final Prospectus, or any amendment or supplement thereto, or any Issuer Free Writing Prospectus, is required under the Securities Act or the Rules and Regulations, the Company shall have filed the Final Prospectus (or such amendment or supplement) or such Issuer Free Writing Prospectus with the Commission in the manner and within the time period so required (without reliance on Rule 424(b)(8) or 164(b) under the Securities Act); the Registration Statement shall remain effective; no stop order suspending the effectiveness of the Registration Statement or any part thereof, any Rule 462 Registration Statement, or any amendment thereof, nor suspending or preventing the use of the Time of Sale Disclosure Package, any Prospectus, the Final Prospectus or any Issuer Free Writing Prospectus shall have been issued; no proceedings for the issuance of such an order shall have been initiated or threatened by the Commission; any request of the Commission or the Representative for additional information (to be included in the Registration Statement, the Time of Sale Disclosure Package, any Prospectus, the Final Prospectus, any Issuer Free Writing Prospectus or otherwise) shall have been complied with to the satisfaction of the Representative.

(b) The Shares shall be approved for listing on the Nasdaq, subject to official notice of issuance and evidence of satisfactory distribution.

(c) FINRA shall have raised no objection to the fairness and reasonableness of the underwriting terms and arrangements.

(d) The Registration Statement, the Time of Sale Disclosure Package, any Prospectus, the Final Prospectus, or any amendment thereof or supplement thereto, or any Issuer Free Writing Prospectus, shall not contain an untrue statement of fact which is material, or omits to state a fact which is material and is required to be stated therein or necessary to make the statements therein, in light of the circumstances under which they were made, not misleading.

(e) On the Closing Date and on each Option Closing Date, there shall have been furnished to the Representative, for the benefit of the Underwriters, the opinion and negative assurance letters of Ballard Spahr LLP, counsel to the Company, each dated the Closing Date or the Option Closing Date, as applicable, and addressed to the Underwriters, in form and substance reasonably satisfactory to the Representative.

(f) On the Closing Date and on each Option Closing Date, there shall have been furnished to the Representative, for the benefit of the Underwriters, the negative assurance letter of Pryor Cashman LLP, counsel to the Underwriters, dated the Closing Date or the Option Closing Date, as applicable, and addressed to the Underwriters, in form and substance reasonably satisfactory to Representative.

(g) The Representative, for the benefit of the Underwriters, shall have received a letter of CohnReznick LLP, on the date hereof and on the Closing Date and on each Option Closing Date, addressed to the Underwriters, confirming that they are an independent registered public accounting firm within the meaning of the Securities Act and are in compliance with the applicable requirements relating to the qualifications of accountants under Rule 2-01 of Regulation S-X of the Commission, and confirming, as of the date of each such letter (or, with respect to matters involving changes or developments since the respective dates as of which specified financial information is given in the Registration Statement, the Time of Sale Disclosure Package and the Final Prospectus, as of a date not prior to the date hereof or more than five days prior to the date of such letter), the conclusions and findings of said firm with respect to the financial information and other matters required by the Underwriters.

(h) On the Closing Date and on each Option Closing Date, there shall have been furnished to the Representative, for the benefit of the Underwriters, a certificate, dated the Closing Date and on each Option Closing Date and addressed to the Underwriters, signed by the chief executive officer and the chief financial officer of the Company, in their capacity as officers of the Company, to the effect that:

(i) The representations and warranties of the Company in this Agreement that are qualified by materiality or by reference to any Material Adverse Effect are true and correct in all respects, and all other representations and warranties of the Company in this Agreement are true and correct, in all material respects, as if made at and as of the Closing Date and on the Option Closing Date, and the Company has complied in all material respects with all the agreements and satisfied all the conditions on its part required to be performed or satisfied at or prior to the Closing Date or on the Option Closing Date, as applicable;

(ii) No stop order or other order (A) suspending the effectiveness of the Registration Statement or any part thereof or any amendment thereof, (B) suspending the qualification of the Securities for offering or sale, or (C) suspending or preventing the use of the Time of Sale Disclosure Package, any Prospectus, the Final Prospectus or any Issuer Free Writing Prospectus, has been issued, and no proceeding for that purpose has been instituted or, to their knowledge, is contemplated by the Commission or any state or regulatory body; and

(iii) There has been no occurrence of any event resulting or reasonably likely to result in a Material Adverse Effect during the period from and after the date of this Agreement and prior to the Closing Date or on the Option Closing Date, as applicable.

(i) On or before the date hereof, the Representative shall have received duly executed lock-up agreement (each a “Lock-Up Agreement”) in the form acceptable to the Representative, by and between the Representative and each of the parties specified in **Schedule IV**.

(j) The Company shall have furnished to the Underwriters and their counsel such additional documents, certificates and evidence as the Representative or its counsel may have reasonably require for the purpose of enabling Underwriters’ counsel to deliver an opinion to the Underwriters, or in order to evidence the accuracy of any of the representations or warranties or the fulfillment of any of the conditions, contained herein.

If any condition specified in this Section 6 shall not have been fulfilled when and as required to be fulfilled, this Agreement may be terminated by the Representative by notice to the Company at any time at or prior to the Closing Date or on the Option Closing Date, as applicable, and such termination shall be without liability of any party to any other party, except that Section 5(a)(viii), Section 9 and Section 10 shall survive any such termination and remain in full force and effect.

7. Indemnification and Contribution.

(a) The Company agrees to indemnify, defend and hold harmless each Underwriter, its affiliates, directors and officers and employees, and each person, if any, who controls such Underwriter within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act, from and against any losses, claims, damages or liabilities to which such party may become subject, under the Securities Act or otherwise (including in settlement of any litigation if such settlement is effected with the written consent of the Company), insofar as such losses, claims, damages or liabilities (or actions in respect thereof) arise out of or are based upon (i) an untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, including the information deemed to be a part of the Registration Statement at the time of effectiveness and at any subsequent time pursuant to Rules 430A and 430B of the Rules and Regulations, or arise out of or are based upon the omission from the Registration Statement, or alleged omission to state therein, a material fact required to be stated therein or necessary to make the statements therein, in light of the circumstances under which they were made, not misleading, (ii) an untrue statement or alleged untrue statement of a material fact contained in the Time of Sale Disclosure Package, any Written Testing-the-Waters Communications, any Prospectus, the Final Prospectus, or any amendment or supplement thereto, any Issuer Free Writing Prospectus, or the Marketing Materials or in any other materials used in connection with the offering of the Securities, or arise out of or are based upon the omission or alleged omission to state therein a material fact required to be stated therein or necessary to make the statements therein, in light of the circumstances under which they were made, not misleading, or (iii) in whole or in part, any inaccuracy in the representations and warranties of the Company contained herein, and will reimburse such party for any legal or other expenses reasonably incurred by such party in connection with evaluating, investigating or defending against such loss, claim, damage, liability or action; *provided, however*, that such indemnity shall not inure to the benefit of any Underwriter (or any person controlling such Underwriter) and the Company shall have no obligation to indemnify, defend or hold harmless any Underwriter in any such case to the extent that any such loss, claim, damage, liability or action arises out of or is based upon an untrue statement or alleged untrue statement or omission or alleged omission made in the Registration Statement, the Time of Sale Disclosure Package, any Written Testing-the-Waters Communications, any Prospectus, the Final Prospectus, or any amendment or supplement thereto or any Issuer Free Writing Prospectus, in reliance upon and in conformity with written information furnished to the Company by the related Underwriter specifically for use in the preparation thereof, which written information is described in Section 7(g).

(b) Each Underwriter, severally and not jointly, will indemnify, defend and hold harmless the Company, its directors and each officer of the Company who signs the Registration Statement and each person, if any, who controls the Company within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act, from and against any losses, claims, damages or liabilities to which such party may become subject, under the Securities Act or otherwise (including in settlement of any litigation, if such settlement is effected with the written consent of such Underwriter), insofar as such losses, claims, damages or liabilities (or actions in respect thereof) arise out of or are based upon an untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, the Time of Sale Disclosure Package, any Prospectus, the Final Prospectus, or any amendment or supplement thereto or any Issuer Free Writing Prospectus, or arise out of or are based upon the omission or alleged omission to state therein a material fact required to be stated therein or necessary to make the statements therein, in light of circumstances under which they were made, not misleading, in each case to the extent, but only to the extent, that such untrue statement or alleged untrue statement or omission or alleged omission was made in the Registration Statement, the Time of Sale Disclosure Package, any Prospectus, the Final Prospectus, or any amendment or supplement thereto or any Issuer Free Writing Prospectus in reliance upon and in conformity with written information furnished to the Company by such Underwriter specifically for use in the preparation thereof, which written information is described in Section 7(f), and will reimburse such party for any legal or other expenses reasonably incurred by such party in connection with evaluating, investigating, and defending against any such loss, claim, damage, liability or action. The obligation of each Underwriter to indemnify the Company (including any controlling person, director or officer thereof) shall be limited to the amount of the underwriting discount applicable to the Shares to be purchased by such Underwriter hereunder actually received by such Underwriter.

(c) Promptly after receipt by an indemnified party under subsection (a) or (b) above of notice of the commencement of any action, such indemnified party shall, if a claim in respect thereof is to be made against the indemnifying party under such subsection, notify the indemnifying party in writing of the commencement thereof; but the failure to notify the indemnifying party shall not relieve the indemnifying party from any liability that it may have to any indemnified party except to the extent such indemnifying party has been materially prejudiced by such failure. In case any such action shall be brought against any indemnified party, and it shall notify the indemnifying party of the commencement thereof, the indemnifying party shall be entitled to participate in, and, to the extent that it shall wish, jointly with any other indemnifying party similarly notified, to assume the defense thereof, with counsel satisfactory to such indemnified party, and after notice from the indemnifying party to such indemnified party of the indemnifying party's election so to assume the defense thereof, the indemnifying party shall not be liable to such indemnified party under such subsection for any legal or other expenses subsequently incurred by such indemnified party in connection with the defense thereof; *provided, however*, that if (i) the indemnified party has reasonably concluded (based on advice of counsel) that there may be legal defenses available to it or other indemnified parties that are different from or in addition to those available to the indemnifying party, (ii) a conflict or potential conflict exists (based on advice of counsel to the indemnified party) between the indemnified party and the indemnifying party (in which case the indemnifying party will not have the right to direct the defense of such action on behalf of the indemnified party), or (iii) the indemnifying party has not in fact employed counsel reasonably satisfactory to the indemnified party to assume the defense of such action within a reasonable time after receiving notice of the commencement of the action, the indemnified party shall have the right to employ a single counsel to represent it in any claim in respect of which indemnity may be sought under subsection (a) or (b) of this Section 7, in which event the reasonable fees and expenses of such separate counsel shall be borne by the indemnifying party or parties and reimbursed to the indemnified party as incurred.

The indemnifying party under this Section 7 shall not be liable for any settlement of any proceeding effected without its written consent, but if settled with such consent or if there be a final judgment for the plaintiff, the indemnifying party agrees to indemnify the indemnified party against any loss, claim, damage, liability or expense by reason of such settlement or judgment. No indemnifying party shall, without the prior written consent of the indemnified party, effect any settlement, compromise or consent to the entry of judgment in any pending or threatened action, suit or proceeding in respect of which any indemnified party is a party or could be named and indemnity was or would be sought hereunder by such indemnified party, unless such settlement, compromise or consent (a) includes an unconditional release of such indemnified party from all liability for claims that are the subject matter of such action, suit or proceeding and (b) does not include a statement as to or an admission of fault, culpability or a failure to act by or on behalf of any indemnified party.

(d) If the indemnification provided for in this Section 7 is unavailable or insufficient to hold harmless an indemnified party under subsection (a) or (b) above, then each indemnifying party shall contribute to the amount paid or payable by such indemnified party as a result of the losses, claims, damages or liabilities referred to in subsection (a) or (b) above, (i) in such proportion as is appropriate to reflect the relative benefits received by the Company on the one hand and the Underwriters on the other from the offering and sale of the Shares or (ii) if the allocation provided by clause (i) above is not permitted by applicable law, in such proportion as is appropriate to reflect not only the relative benefits referred to in clause (i) above but also the relative fault of the Company on the one hand and the Underwriters on the other in connection with the statements or omissions that resulted in such losses, claims, damages or liabilities, as well as any other relevant equitable considerations. The relative benefits received by the Company on the one hand and the Underwriters on the other shall be deemed to be in the same proportion as the total net proceeds from the offering (before deducting expenses) received by the Company bear to the total underwriting discount received by the Underwriters, in each case as set forth in the table on the cover page of the Final Prospectus. The relative fault shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or the omission or alleged omission to state a material fact relates to information supplied by the Company or the Underwriters and the parties' relevant intent, knowledge, access to information and opportunity to correct or prevent such untrue statement or omission. The Company and the Underwriters agree that it would not be just and equitable if contributions pursuant to this subsection (e) were to be determined by pro rata allocation or by any other method of allocation that does not take account of the equitable considerations referred to in the first sentence of this subsection (e). The amount paid by an indemnified party as a result of the losses, claims, damages or liabilities referred to in the first sentence of this subsection (e) shall be deemed to include any legal or other expenses reasonably incurred by such indemnified party in connection with investigating or defending against any action or claim that is the subject of this subsection (e). Notwithstanding the provisions of this subsection (e), no Underwriter shall be required to contribute any amount in excess of the amount of the underwriting discount applicable to the Shares to be purchased by such Underwriter hereunder actually received by such Underwriter. No person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Securities Act) shall be entitled to contribution from any person who was not guilty of such fraudulent misrepresentation. The Underwriters' respective obligations to contribute as provided in this Section 7 are several in proportion to their respective underwriting commitments and not joint.

(e) The obligations of the Company under this Section 7 shall be in addition to any liability that the Company may otherwise have and the benefits of such obligations shall extend, upon the same terms and conditions, to each person, if any, who controls any Underwriter within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act; and the obligations of each Underwriter under this Section 7 shall be in addition to any liability that each Underwriter may otherwise have and the benefits of such obligations shall extend, upon the same terms and conditions, to the Company, and its officers, directors and each person who controls the Company within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act.

(f) For purposes of this Agreement, each Underwriter severally confirms, and the Company acknowledges, that there is no information concerning such Underwriter furnished in writing to the Company by such Underwriter specifically for preparation of or inclusion in the Registration Statement, the Time of Sale Disclosure Package, any Prospectus, the Final Prospectus or any Issuer Free Writing Prospectus, other than the statement set forth in the last paragraph on the cover page of the Prospectus, the marketing and legal names of each Underwriter, and the statements set forth in the "Underwriting" section of the Registration Statement, the Time of Sale Disclosure Package, and the Final Prospectus only insofar as such statements relate to the amount of selling concession and re-allowance, if any, or to over-allotment, stabilization and related activities that may be undertaken by such Underwriter.

8. Representations and Agreements to Survive Delivery. All representations, warranties, and agreements of the Company contained herein or in certificates delivered pursuant hereto, including, but not limited to, the agreements of the several Underwriters and the Company contained in Section 5(a)(vii) and Section 7 hereof, shall remain operative and in full force and effect regardless of any investigation made by or on behalf of the several Underwriters or any controlling person thereof, or the Company or any of its officers, directors, or controlling persons, and shall survive delivery of, and payment for, the Shares to and by the Underwriters hereunder.

9. Termination of this Agreement.

(a) The Representative shall have the right to terminate this Agreement by giving notice to the Company as hereinafter specified at any time at or prior to the Closing Date or any Option Closing Date (as to the Option Shares to be purchased on such Option Closing Date only), if in the discretion of the Representative, (i) there has occurred any material adverse change in the securities markets or any event, act or occurrence that has materially disrupted, or in the opinion of the Representative, will in the future materially disrupt, the securities markets or there shall be such a material adverse change in general financial, political or economic conditions or the effect of international conditions on the financial markets in the United States is such as to make it, in the judgment of the Representative, inadvisable or impracticable to market the Shares or enforce contracts for the sale of the Shares (ii) trading in the Company's Common Stock shall have been suspended by the Commission or the Nasdaq or trading in securities generally on the Nasdaq Stock Market, the NYSE or the NYSE MKT shall have been suspended, (iii) minimum or maximum prices for trading shall have been fixed, or maximum ranges for prices for securities shall have been required, on the Nasdaq Stock Market, the NYSE or NYSE MKT, by such exchange or by order of the Commission or any other governmental authority having jurisdiction, (iv) a banking moratorium shall have been declared by federal or state authorities, (v) there shall have occurred any attack on, outbreak or escalation of hostilities or act of terrorism involving the United States, any declaration by the United States of a national emergency or war, any substantial change or development involving a prospective substantial change in United States or other international political, financial or economic conditions or any other calamity or crisis, (vi) the Company suffers any material loss by strike, fire, flood, earthquake, accident or other calamity, whether or not covered by insurance, or (vii) in the judgment of the Representative, there has been, since the time of execution of this Agreement or since the respective dates as of which information is given in the Registration Statement, the Time of Sale Disclosure Package or the Final Prospectus, any material adverse change in the assets, properties, condition, financial or otherwise, or in the results of operations, business affairs or business prospects of the Company and its subsidiaries considered as a whole, whether or not arising in the ordinary course of business. Any such termination shall be without liability of any party to any other party except that the provisions of Section 5(a)(viii) and Section 9 hereof shall at all times be effective and shall survive such termination.

(b) If the Representative elects to terminate this Agreement as provided in this Section, the Company and the other Underwriters shall be notified promptly by the Representative by telephone, confirmed by letter.

10. Substitution of Underwriters. If any Underwriter or Underwriters shall default in its or their obligations to purchase Shares hereunder on the Closing Date or any Option Closing Date and the aggregate number of Shares which such defaulting Underwriter or Underwriters agreed but failed to purchase does not exceed ten percent (10%) of the total number of Shares to be purchased by all Underwriters on such Closing Date or Option Closing Date, the other Underwriters shall be obligated severally, in proportion to their respective commitments hereunder, to purchase the Shares which such defaulting Underwriter or Underwriters agreed but failed to purchase on such Closing Date or Option Closing Date. If any Underwriter or Underwriters shall so default and the aggregate number of Shares with respect to which such default or defaults occur is more than ten percent (10%) of the total number of Shares to be purchased by all Underwriters on such Closing Date or Option Closing Date and arrangements satisfactory to the remaining Underwriters and the Company for the purchase of such Shares by other persons are not made within forty-eight (48) hours after such default, this Agreement shall terminate.

If the remaining Underwriters or substituted Underwriters are required hereby or agree to take up all or part of the Shares of a defaulting Underwriter or Underwriters on such Closing Date or Option Closing Date as provided in this Section 10, (i) the Company shall have the right to postpone such Closing Date or Option Closing Date for a period of not more than five (5) full business days in order to permit the Company to effect whatever changes in the Registration Statement, the Final Prospectus, or in any other documents or arrangements, which may thereby be made necessary, and the Company agrees to promptly file any amendments to the Registration Statement or the Final Prospectus which may thereby be made necessary, and (ii) the respective numbers of Shares to be purchased by the remaining Underwriters or substituted Underwriters shall be taken as the basis of their underwriting obligation for all purposes of this Agreement. Nothing herein contained shall relieve any defaulting Underwriter of its liability to the Company or any other Underwriter for damages occasioned by its default hereunder. Any termination of this Agreement pursuant to this Section 10 shall be without liability on the part of any non-defaulting Underwriters or the Company, except that the representations, warranties, covenants, indemnities, agreements and other statements set forth in Section 2 and 3, the obligations with respect to expenses to be paid or reimbursed pursuant to Section 5 and the provisions of Section 5(a)(viii) and Section 9 and Sections 11 through 19, inclusive, shall not terminate and shall remain in full force and effect.

As used in this Agreement, the term "Underwriter" shall be deemed to include any person substituted for a defaulting Underwriter under this Section 10. Any action taken under this Section 10 shall not relieve any defaulting Underwriter from liability in respect of any default of such Underwriter under this Agreement.

11. Notices. Except as otherwise provided herein, all communications hereunder shall be in writing and, if to the Representative, shall be mailed, delivered or telecopied to Aegis Capital Corp., 810 7th Avenue, 18th Floor, New York, NY 10019, telecopy number: (212) 813-1047, Attention: Managing Director; and if to the Company, shall be mailed, delivered or telecopied to it at 708 Quince Orchard Road, Suite 205, Gaithersburg, MD 20878, telecopy number: _____, Attention: _____; or in each case to such other address as the person to be notified may have requested in writing. Any party to this Agreement may change such address for notices by sending to the parties to this Agreement written notice of a new address for such purpose.

12. Persons Entitled to Benefit of Agreement. This Agreement shall inure to the benefit of and be binding upon the parties hereto and their respective successors and assigns and the controlling persons, officers and directors referred to in Section 9. Nothing in this Agreement is intended or shall be construed to give to any other person, firm or corporation any legal or equitable remedy or claim under or in respect of this Agreement or any provision herein contained. The term "successors and assigns" as herein used shall not include any purchaser, as such purchaser, of any of the Shares from any Underwriters.

13. Absence of Fiduciary Relationship. The Company acknowledges and agrees that: (a) each Underwriter has been retained solely to act as underwriter in connection with the sale of the Shares and that no fiduciary, advisory or agency relationship between the Company and any Underwriter has been created in respect of any of the transactions contemplated by this Agreement, irrespective of whether the Underwriter has advised or is advising the Company on other matters; (b) the price and other terms of the Shares set forth in this Agreement were established by the Company following discussions and arms-length negotiations with the Underwriters and the Company is capable of evaluating and understanding and understands and accepts the terms, risks and conditions of the transactions contemplated by this Agreement; (c) it has been advised that the Underwriters and its affiliates are engaged in a broad range of transactions that may involve interests that differ from those of the Company and that no Underwriter has any obligation to disclose such interest and transactions to the Company by virtue of any fiduciary, advisory or agency relationship; and (d) it has been advised that each Underwriter is acting, in respect of the transactions contemplated by this Agreement, solely for the benefit of such Underwriter, and not on behalf of the Company.

14. Amendments and Waivers. No supplement, modification or waiver of this Agreement shall be binding unless executed in writing by the party to be bound thereby. The failure of a party to exercise any right or remedy shall not be deemed or constitute a waiver of such right or remedy in the future. No waiver of any of the provisions of this Agreement shall be deemed or shall constitute a waiver of any other provision hereof (regardless of whether similar), nor shall any such waiver be deemed or constitute a continuing waiver unless otherwise expressly provided.

15. Partial Unenforceability. The invalidity or unenforceability of any section, paragraph, clause or provision of this Agreement shall not affect the validity or enforceability of any other section, paragraph, clause or provision.

16. Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of New York, without regard to its conflicts of laws principles.

17. Submission to Jurisdiction. The Company irrevocably (a) submits to the jurisdiction of the Supreme Court of the State of New York, Borough of Manhattan or the United States District Court for the Southern District of New York for the purpose of any suit, action, or other proceeding arising out of this Agreement, or any of the agreements or transactions contemplated by this Agreement, the Registration Statement, the Time of Sale Disclosure Package, any Prospectus and the Final Prospectus (each a "Proceeding"), (b) agrees that all claims in respect of any Proceeding may be heard and determined in any such court, (c) waives, to the fullest extent permitted by law, any immunity from jurisdiction of any such court or from any legal process therein, (d) agrees not to commence any Proceeding other than in such courts, and (e) waives, to the fullest extent permitted by law, any claim that such Proceeding is brought in an inconvenient forum. **THE COMPANY (ON BEHALF OF ITSELF AND, TO THE FULLEST EXTENT PERMITTED BY LAW, ON BEHALF OF ITS RESPECTIVE EQUITY HOLDERS AND CREDITORS) HEREBY WAIVES ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN RESPECT OF ANY CLAIM BASED UPON, ARISING OUT OF OR IN CONNECTION WITH THIS AGREEMENT AND THE TRANSACTIONS CONTEMPLATED BY THIS AGREEMENT, THE REGISTRATION STATEMENT, THE TIME OF SALE DISCLOSURE PACKAGE, ANY PROSPECTUS AND THE FINAL PROSPECTUS.**

18. Counterparts. This Agreement may be executed and delivered (including by facsimile transmission or electronic mail) in one or more counterparts and, if executed in more than one counterpart, the executed counterparts shall each be deemed to be an original and all such counterparts shall together constitute one and the same instrument.

[Signature Page Follows]

Please sign and return to the Company the enclosed duplicates of this letter whereupon this letter will become a binding agreement between the Company and the several Underwriters in accordance with its terms.

Very truly yours,

OPGEN, INC.

By: /s/ Timothy C. Dec

Name: Timothy C. Dec

Title: Chief Financial Officer

Confirmed as of the date first above-mentioned
by the Representative of the several Underwriters.

AEGIS CAPITAL CORP.

By: /s/ Edward Tsuker

Name: Edward Tsuker

Title: Head of Investment
Banking

SCHEDULE I

<u>Name</u>	<u>Number of Firm Shares to be Purchased</u>	<u>Number of Option Shares to be Purchased</u>
Aegis Capital Corp.	2,220,000	330,751
Total	2,220,000	330,751

SCHEDULE II

Final Term Sheet

Issuer:	OpGen, Inc. (the "Company")
Symbol:	OPGN
Securities:	2,220,000 shares of common stock, par value \$0.01 per share (the "Common Stock"), of the Company.
Over-allotment option:	Up to an additional 330,751 shares of Common Stock at a price of \$1.45 per share.
Public offering price:	\$1.45 per share of Common Stock
Underwriting discount:	\$0.087 per share of Common Stock
Expected net proceeds:	Approximately \$2.8 million (\$3.3 million if the overallotment option is exercised in full) (after deducting the underwriting discount and estimated offering expenses payable by the Company).
Trade date:	October 18, 2018
Settlement date:	October 22, 2018
Underwriters:	Aegis Capital Corp.

SCHEDULE III

Free Writing Prospectus

None.

SCHEDULE IV

List of officers, directors and stockholders executing lock-up agreements

Evan Jones
Harry J. D'Andrea
Timothy J.R. Harris, Ph.D., D.Sc
Tina S. Nova, Ph.D.
David M. Rubin, Ph.D.
Misti Ushio, Ph.D.
Timothy Dec
Vadim Sapiro

Ballard Spahr

1735 Market Street, 51st Floor
 Philadelphia, PA 19103-7599
 TEL 215.665.8500
 FAX: 215.864.8999
 www.ballardspahr.com

October 18, 2018

OpGen, Inc.
 708 Quince Orchard Road
 Suite 205
 Gaithersburg, Maryland 20878

RE: OpGen, Inc.

Ladies and Gentlemen:

We have acted as counsel to OpGen, Inc., a Delaware corporation (the “Company”), in connection with (i) a Registration Statement on Form S-3 (Registration No. 333-213356) (the “Registration Statement”) filed by the Company with the U.S. Securities and Exchange Commission (the “Commission”) under the Securities Act of 1933, as amended (the “Securities Act”), and declared effective by the Commission on September 9, 2016, (ii) a preliminary prospectus supplement, dated October 17, 2018 (the “Preliminary Prospectus Supplement”) to the prospectus which forms a part of the Registration Statement, and (iii) a final prospectus supplement, dated October 18, 2018 (the “Final Prospectus Supplement”) to the prospectus which forms a part of the Registration Statement, relating to the public offering of (a) 2,220,000 shares (the “Firm Shares”) of common stock of the Company, \$0.01 par value per share (the “Common Stock”), pursuant to that certain Underwriting Agreement, dated October 18, 2018, by and between the Company and Aegis Capital Corp. (the “Underwriting Agreement”), and (b) up to an additional 330,751 shares (the “Option Shares,” and together with the Firm Shares, the “Shares”) of Common Stock to cover any over-allotments, if any, pursuant to the Underwriting Agreement.

We have examined originals or copies (certified or otherwise identified to our satisfaction) of (i) the Amended and Restated Certificate of Incorporation of the Company together with all amendments thereto; (ii) the Certificate of Correction to the Amended and Restated Certificate of Incorporation; (iii) the form of Certificate of Designation of Preferences, Rights and Limitations of Series B Convertible Preferred Stock; (iv) the Amended and Restated Bylaws of the Company; (v) the Registration Statement and the exhibits thereto; (vi) the Prospectus; (vii) the Purchase Agreement; (viii) such other corporate records, agreements, documents and instruments; and (ix) such certificates or comparable documents of public officials and other sources, believed by us to be reliable, and of officers and representatives of the Company, and have made such inquiries of such officers and representatives, as we have deemed relevant and necessary as a basis for the opinions hereinafter set forth.

In such examination, we have assumed the genuineness of all signatures, the legal capacity of all natural persons, the authenticity of all documents submitted to us as originals, the conformity to original documents of all documents submitted to us as certified, conformed or photostatic copies and the authenticity of the originals of such latter documents. As to all questions of fact material to this opinion that have not been independently established, we have relied upon certificates or comparable documents of officers and representatives of the Company.

Based upon the foregoing, and subject to the qualifications, assumptions and limitations set forth herein, we are of the opinion that the Shares are or will be, upon issuance, duly authorized, and, when issued and sold in accordance with the terms and conditions of the Underwriting Agreement and in the manner contemplated by the Final Prospectus Supplement, will be validly issued, fully paid and non-assessable.

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

We hereby consent to the filing of this opinion with the Commission as an exhibit to the Registration Statement in accordance with the requirements of Item 601(b)(5) of Regulation S-K promulgated under the Securities Act, and to the use of this firm’s name therein and in the Prospectus under the caption “Legal Matters.” In giving this consent, we do not admit that we are within the category of persons whose consent is required by Section 7 of the Securities Act and the rules and regulations promulgated thereunder.

Sincerely yours,

/s/ Ballard Spahr LLP



OPGEN ANNOUNCES PROPOSED PUBLIC OFFERING OF COMMON STOCK

GAITHERSBURG, Md. (October 17, 2018) – OpGen, Inc. (NASDAQ: OPGN) today announced that it has commenced an underwritten public offering of its common stock. All of the shares are being offered by OpGen, Inc. The offering is subject to market and other conditions, and there can be no assurance as to whether or when the offering may be completed, or as to the actual size or terms of the offering.

The Company intends to use the net proceeds of this offering for research and development, including funding the continued development and manufacturing of its Acuitas® AMR Gene Panel tests, including its Acuitas AMR Gene Panel u5.47 that was released for Research Use Only in February 2018 and its Acuitas Lighthouse® software, to support acquisitions of products and technologies, capital expenditures, working capital and other general corporate purposes.

Aegis Capital Corp. is acting as the sole book-running manager for the proposed offering.

The shares will be issued pursuant to a shelf registration statement previously filed with and subsequently declared effective by the Securities and Exchange Commission (SEC). A preliminary prospectus supplement and accompanying prospectus relating to the offering will be filed with the SEC and will be available on the SEC's website at www.sec.gov. A copy of the preliminary prospectus supplement and accompanying prospectus relating to the offering, when available, may be obtained by contacting Aegis Capital Corp., 810 7th Avenue, 18th Floor, New York, NY 10019, (212) 813-1010 or by accessing the SEC's website, www.sec.gov.

This press release does not and shall not constitute an offer to sell or the solicitation of an offer to buy any securities, nor shall there be any sale of these securities in any state or other jurisdiction in which such offer, solicitation or sale would be unlawful prior to registration or qualification under the securities laws of any such state or other jurisdiction. Any offer, if at all, will be made only by means of a prospectus, including a prospectus supplement, forming a part of the effective registration statement.

About OpGen

OpGen, Inc. is harnessing the power of informatics and genomic analysis to provide complete solutions for patient, hospital, and network-wide infection prevention and treatment. For more information, please visit www.opgen.com.

OpGen, Acuitas, Acuitas Lighthouse, and QuickFISH are registered trademarks of OpGen, Inc.

The Acuitas AMR Gene Panel u5.47 (RUO) and the Acuitas Lighthouse Software (RUO) are intended for Research Use Only and are not for use in diagnostic procedures. The Acuitas Lighthouse Software is not distributed commercially for antibiotic resistance prediction and is not for use in diagnostic procedures.

Forward-Looking Statements

This press release includes statements relating to the expected proceeds from the Company's public offering, the closing of the offering and the use of the net proceeds to further the development and commercialization of the Company's products and services. These statements and other statements regarding OpGen's future plans and goals constitute "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, and are intended to qualify for the safe harbor from liability established by the Private Securities Litigation Reform Act of 1995. Such statements are subject to risks and uncertainties that are often difficult to predict, are beyond our control, and which may cause results to differ materially from expectations. Factors that could cause our results to differ materially from those described include, but are not limited to, our ability to successfully, timely and cost-effectively develop, seek and obtain regulatory clearance for and commercialize our product and services offerings, our ability to successfully complete the pilot portion of the NY State project, the rate of adoption of our products and services by hospitals and other healthcare providers, the effect on our business of existing and new regulatory requirements, and other economic and competitive factors. For a discussion of the most significant risks and uncertainties associated with OpGen's business, please review our filings with the Securities and Exchange Commission. You are cautioned not to place undue reliance on these forward-looking statements, which are based on our expectations as of the date of this press release and speak only as of the date of this press release. We undertake no obligation to publicly update or revise any forward-looking statement, whether as a result of new information, future events or otherwise.

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OPGEN ANNOUNCES PRICING OF PUBLIC OFFERING OF COMMON STOCK

GAITHERSBURG, Md. (October 18, 2018) – **OpGen, Inc. (NASDAQ: OPGN)** today announced the pricing of an underwritten public offering of approximately 2.2 million shares of its common stock at a public offering price of \$1.45 per share. The company has also granted to the underwriters a 45-day option to acquire an additional 330,751 shares to cover overallotments in connection with the offering. The gross proceeds to OpGen from this offering, before deducting underwriting discounts and commissions and offering expenses payable by OpGen, are expected to be approximately \$3.2 million. The offering is expected to close on or about October 22, 2018, subject to customary closing conditions.

The Company intends to use the net proceeds of this offering for research and development, including funding the continued development and manufacturing of its Acuitas® AMR Gene Panel tests, including its Acuitas AMR Gene Panel u5.47 that was released for Research Use Only in February 2018 and its Acuitas Lighthouse® software, to support acquisitions of products and technologies, capital expenditures, working capital and other general corporate purposes.

Aegis Capital Corp. acted as the sole book-running manager for the offering.

The shares will be issued pursuant to a shelf registration statement previously filed with and subsequently declared effective by the Securities and Exchange Commission (SEC). A final prospectus supplement and accompanying prospectus will be filed with the SEC. A copy of the final prospectus supplement and accompanying prospectus relating to the offering, when available, may be obtained by contacting Aegis Capital Corp., 810 7th Avenue, 18th Floor, New York, NY 10019, (212) 813-1010 or by accessing the SEC's website, www.sec.gov.

This press release does not and shall not constitute an offer to sell or the solicitation of an offer to buy any securities, nor shall there be any sale of these securities in any state or other jurisdiction in which such offer, solicitation or sale would be unlawful prior to registration or qualification under the securities laws of any such state or other jurisdiction. Any offer, if at all, will be made only by means of a prospectus, including a prospectus supplement, forming a part of the effective registration statement.

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